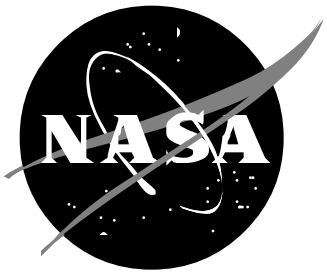

National Aeronautics and Space Administration

January 9, 1998
AO 98-OSS-XX

DRAFT for Community Comment

Announcement of Opportunity

Discovery Program

Comment Due Date: **January 30, 1998**

OMB Approval No. 2700-0085

Discovery Program

Announcement of Opportunity
Soliciting Proposals
for Basic Research in Space Science

AO 98-OSS-XX
Issued: January 9, 1998

Office of Space Science
National Aeronautics and Space Administration
Washington, DC 20546-0001

ANNOUNCEMENT OF OPPORTUNITY

DISCOVERY MISSIONS

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1.0 DESCRIPTION OF OPPORTUNITY

1.1 Introduction and Announcement Objectives

The National Aeronautics and Space Administration (NASA) announces the opportunity to conduct planetary science investigations through Discovery Program space flight missions that meet the goals of planetary system(s) exploration. For the purpose of this announcement, the terms, "planetary science" and "planetary system(s) exploration" encompass:

- The scientific objectives of the NASA Solar System Exploration theme;
- The search for the extrasolar planetary systems elements of the NASA Astronomical search for Origins theme

These themes are amplified in documents cited in section 2.1. Discovery missions, therefore, are solar system science missions intended for travel to and exploration of solar system bodies, and for remote examination of the solar system and extrasolar planetary system environments.

The strategic role of the Discovery program is to address Space Science Enterprise science goals and objectives that are within the scope of the Discovery program and not addressed by missions explicitly included in the Space Science Enterprise Strategic Plan (See Section 2.1 and/or Appendix E). Missions that are intended to achieve science goals of missions already in the Strategic Plan for a similar time period may not be proposed for consideration by this AO. Missions, for examples, with science goals similar to those for the Pluto/Kuiper Express, Europa Orbiter, and Mars 2003 should not be proposed.

The Discovery Program is designed to accomplish frequent, high quality planetary science investigations utilizing innovative, streamlined, and efficient management approaches. It seeks to reduce total mission cost substantially and to improve performance through the use of new technology and through commitment to, and control of, design/development and operations costs, and to transfer new technology among space, nonspace firms, educational, other nonprofit organizations, and government entities. It requires proposers to set goals for the participation of small disadvantaged businesses, women-owned small businesses, Historically Black Colleges and Universities, and other Minority Educational Institutions in proposed procurements. Finally, it seeks to enhance public awareness of, and appreciation for, space exploration and to incorporate educational and public outreach activities into planetary science investigations.

Proposals to the Discovery Program will demand careful tradeoffs between science and cost in order to produce investigations with the highest possible science value for the cost. Investigations proposed at or near the cost cap may be selected only if the science is especially compelling. NASA is seeking program balance between lower and higher cost investigations that will allow a mission launch every 12 to 24 months within the Discovery funding profile. Accordingly, the total cost to NASA for all phases of the investigation, including mission launch services and the spacecraft, will be a determining factor in selection.

This AO invites proposals for investigations for the seventh Discovery mission. Discovery investigations are complete missions launched on Expendable Launch Vehicles. It also solicits missions that address the thematic areas of the Discovery Program using non-NASA space missions. These missions are identified in this announcement as "Missions of Opportunity".

Participation in Missions of Opportunity may be undertaken through the Discovery program when the perceived value is high and the proposed cost to NASA is within the funding limits of the Discovery program. NASA is not required to select a Mission of Opportunity under this solicitation. The Discovery program also expects Missions of Opportunity to meet other program objectives for reducing cost, injecting new technology, and enhancing education and public outreach. Note that if a Mission of Opportunity is selected, a reduced flight rate of other Discovery missions is expected. Further information on Missions of Opportunity is given in Section 4.0.

Proposals submitted in response to this AO for Discovery missions must be for complete investigations from project initiation (Phase A/B) through mission operations (Phase E), which is to include analysis and publication of data in the peer reviewed scientific literature and delivery of the data to the Planetary Data System (PDS), and must be consistent with the criteria specified in this AO. Proposals that describe only portions of an investigation (such as the provision of an instrument as part of a nondomestic mission), or that do not address all phases from preliminary analysis through operations and analysis and delivery of the data, should be proposed as Missions of Opportunity.

Approximately four to six investigations will be selected under this AO and will be awarded contracts to conduct concept studies with options for the follow-on phases. NASA will review the results of the concept studies and intends to select one investigation for flight. However, NASA reserves the right to select and approve additional investigations based on funding availability and overall compelling scientific merit. Investigations not selected for concept study or flight may recompete for a future flight opportunity under a subsequent Discovery Program AO.

1.2 Proposal Evaluation and Selection Process

The selection process for this Discovery AO will be done in two phases.

- In phase one, selection of proposals submitted in response to this AO will be based principally on their scientific merit, as evaluated by peer review. In accordance with NASA's desire to fly missions as frequently as possible, the proposed cost to NASA will also be an important selection criterion, but will be given lower weight than scientific merit. The technical merit and feasibility of the scientific investigation, the feasibility of the mission implementation scheme, and demonstrated commitment to education and public outreach, technology infusion/transfer, and participation of small, small disadvantaged businesses will be additional selection criteria, but will be given still lower and approximately equal weights. It is anticipated that four to six proposals will be selected and awarded contracts as a result of this first phase.

· Phase two begins with a four-month concept study conducted by each selected investigation team. Each concept study will be funded up to $375K by NASA. At the end of the concept studies, NASA will conduct a detailed review to evaluate the implementing details of the selected investigations, namely, any modifications of the scientific objectives; the proposed cost to NASA; design details of the experiment hardware; plans for mission implementation, including all technical and management factors; details of the education and public outreach programs; plans for the infusion and transfer out of new technology (as appropriate). As a result of this second evaluation, one or more mission investigations will be selected for implementation leading to flight.

1.3 Proposal Opportunity Period and Schedule

NASA is seeking an investigation with a mission launch date no later than September 30, 2004; investigations with anticipated launch dates later than this should be proposed in response to a subsequent Discovery AO. However, proposed investigations with launch dates later than that date may be considered if there are sufficiently compelling reasons for them to be considered at this time.

NASA is also seeking Missions of Opportunity through this AO where a commitment from NASA is needed by the sponsoring organization before December 31, 1999. The launch dates for these missions may be at any time. Missions of Opportunity requiring later commitment dates should propose in response to a subsequent Discovery program AO. The following schedule describes the major milestones for this Discovery Announcement of Opportunity:

AO release.....March 20, 1998
Preproposal Conference.....April 7, 1998
Notice of intent due.....April 20, 1998
Proposal due by 5 pm CDT.....June 22, 1998
Nondomestic Letter of Endorsement due.....July 22, 1998
Selections announced (target).....November 1998
Concept Study due (target).....March 1999
Downselection of investigations (target).....May 1999

2.0 PROGRAM GOALS AND OBJECTIVES

2.1 Planetary System(s) Exploration Goals

The scientific goals of the planetary system(s) exploration within the Office of Space Science (OSS) are generally contained in *The Space Science Enterprise Strategic Plan: Origins, Evolution, and Destiny of the Comos and Life*, dated November 1997. The goals in this plan are supported by the documents *Mission to the Solar System: Exploration and Discovery, A Mission and Technology Roadmap, 2000- 2025*, dated September 1996, the report of the Solar System Exploration Subcommittee, titled *Solar System Exploration 1995-2000*, and the report of the

National Research Council's Committee on Planetary and Lunar Exploration, titled *An Integrated Strategy for the Planetary Sciences: 1995-2010.* The goals related to the search for extrasolar planetary systems in this plan are supported by ***Search for Origins Roadmap*** (April 1997), the Association of Universities for Research in Astronomy report *HST and Beyond. Exploration and Search for Origins: A Vision for Ultraviolet - Optical - Infrared Space Astronomy*, and the Jet Propulsion Laboratory report *Exploration of Neighboring Planetary Systems (ExNPS)*. All of these documents are contained in the Discovery Program Library (see Appendix E). The scientific goals in these referenced documents as they relate to the scientific objectives of the NASA Solar System Exploration theme, and the search for extrasolar planetary systems element of the NASA Origins theme, (see Section 1.1) form the basis of the science evaluation criteria.

The goals and strategies outlined in the above documents encompass a wide range of scientific questions spanning a variety of scientific disciplines that NASA seeks to address by supporting investigations in three broad categories: (1) laboratory research and theoretical analyses, (2) ground-based astronomical observations, and (3) flight projects. The Discovery Program solicits only those investigations that fall into the third category. Investigations proposed to be accomplished as flight projects in the Discovery Program include, but are not limited to, remote observations from Earth-orbiting spacecraft, flyby and/or rendezvous/orbiter spacecraft, soft landers and/or penetrators, and sample return missions.

2.2 Discovery Program Objectives

Principal Goal: Perform frequent, high-quality scientific investigations that assure the highest science value for cost.

By conducting a series of planetary systems science investigations at the highest value for cost, NASA will provide a mechanism by which the most pressing questions in planetary systems science may be addressed, permitting a steady improvement in our understanding of planetary systems and the processes that affect them. The frequent, steady nature of the investigations will assure a continuing stream of fresh scientific data to the planetary systems science community, thus helping to maintain the excellence of the U.S. planetary systems science program.

Supporting Objective 1: Pursue innovative ways of doing business.

The short development schedule and low costs associated with Discovery demand innovative business and management practices. NASA's approach to Discovery investigations encourages teaming arrangements among industry, university, and/or Government partners. Competitively selected teams will have the responsibility and authority to accomplish the entire mission. This will permit them to utilize innovative approaches necessary to stay within the strict cost and schedule limits of the program. NASA oversight and reporting requirements will be limited to only that which is essential to assure science investigation success in compliance with committed cost, schedule, performance, reliability, and safety requirements.

Supporting Objective 2: Encourage the use of new technologies to achieve program objectives.

The inclusion of new technologies to achieve performance enhancements and to reduce total mission cost is encouraged in Discovery proposals. The use of new technologies will enable more aggressive and exciting scientific objectives to be pursued. The teaming of industry, university, and Government is meant to foster an environment conducive to technology development and utilization.

Supporting Objective 3: Enhance general public awareness of, and appreciation for, planetary system(s) exploration and support the Nation's educational initiatives.

Contributing to improving science education and the public understanding of science are goals of the Discovery Program and of the Office of Space Science as a whole. The Discovery Program is committed to incorporating program elements directed toward informing the public and providing educational opportunities that support the Nation's educational initiatives.

2.3 Missions of Opportunity

Missions of Opportunity are investigations characterized by being part of a non-NASA space mission of any size, but having a NASA cost that is typically under $21 million (in Fiscal Year 1998 dollars) total cost to NASA. These missions are conducted on a no-exchange-of-funds basis with the organization sponsoring the mission. NASA intends to solicit proposals for Missions of Opportunity with each future AO issued for Discovery investigations. For each AO, the cost limit for Missions of Opportunity is expected to be constant, adjusted only for inflation.

3.0 DISCOVERY PROGRAM CONSTRAINTS, GUIDELINES, AND REQUIREMENTS

This section describes the constraints, guidelines, and requirements applicable to all Discovery program selections. Additional constraints specific to Missions of Opportunity are in Section 4. Specific directions for proposal preparation are included in Section 5 and in Appendix B. Specific guidance relative to the concept study preparation is contained in Appendix G.

3.1 General Program Constraints and Guidelines

In the Discovery Program, the major responsibility for the selected investigation rests with the investigation team, which will have a large degree of freedom to accomplish its proposed objectives within the stated constraints with only essential NASA oversight. Once an investigation has been selected for flight, failure to maintain reasonable progress on an agreed upon schedule or failure to operate within the constraints outlined below may be cause for its termination by NASA.

Every aspect of a Discovery investigation must reflect a commitment to mission success while keeping total costs as low as possible. Consequently, investigations should be designed and

scoped to emphasize mission success within cost and schedule constraints by incorporating sufficient margins, reserves, and content resiliency.

Only those investigations whose proposed cost, design/development schedule, and launch vehicle requirements are within the constraints and guidelines identified herein will be considered as candidates for selection. Investigations significantly below the cost and launch vehicle constraints are encouraged in order to enable more frequent and, therefore, diverse Discovery Program missions.

The strategic role of the Discovery program is to address Space Science Enterprise science goals and objectives that are within the scope of the Discovery program and not addressed by missions explicitly included in the OSS Enterprise Strategic Plan (See Section 2.1 and/or Appendix E). Missions that are intended to achieve science goals of missions already in the Strategic Plan for a similar time period may not be proposed for consideration by this AO. Missions, for examples, with science goals similar to those for the Pluto/Kuiper Express, Europa Orbiter, and Mars 2003 should not be proposed.

3.1.1 Cost and Schedule Constraints

The Discovery Program is part of an effort to develop a program of frequent, successful, small planetary investigations. To this end, NASA will limit its funding of Discovery mission development costs (costs incurred from the start of Phase C/D to launch plus 30 days) and mission operations and data analysis (Phase E) to $190 million and $44 million, respectively, in FY 1999 dollars ($190 million and $44 million in FY 1999 equates to $150 million and $35 million in FY 1992 dollars). Phase E periods that require funding levels greater than $43 million are permitted if Phase C/D costs are reduced accordingly. Phase A/B costs will also be funded by the Office of Space Science (OSS) but will not be considered within the development cap. Phase A/B costs are not constrained; however, costs exceeding 10% of Phase C/D costs will be deducted from the Phase C/D cap.

Cost Constraints		
Phase A/B	Phase C/D (thru launch plus 30 days)	Phase E
no constraint up to 10% of Phase C/D cost*	$190 million Maximum	$44 million Maximum

* Costs exceeding 10% of Phase C/D will be deducted from C/D cap
Note: FY 1999 dollars

The Discovery Program is also intended to provide a mechanism to accomplish important scientific investigations within a short time, so the schedule for all Discovery missions must be such that the launch takes place within 35 months from the start of the design/development phase (Phase C/D). Note that Phases A and B have been combined into a single phase ending

approximately one month after preliminary design review. The design/development phase is defined as ending 30 days after launch, so the maximum permissible length of any Discovery mission Phase C/D is 36 months. No constraint is placed on the length of Phase A/B or Phase E. Procurement of long-lead materials is permitted during the Phase A/B timeframe but should be shown as a Phase C/D task and, therefore, as a Phase C/D cost. The Phase C/D long-lead procurement overlap with Phase A/B will not be considered when determining the length of Phase C/D.

Schedule Constraints			
Phase A/B	Phase C/D (thru launch plus 30 days)	Launch	Phase E
no time limit	≤ 36 mo.	≤ Sept 30, 2004	no time limit

Launch services will be provided by NASA only for a medium class (Delta II 7925) or smaller expendable launch vehicle (see Discovery Launch Services Information Summary document in the Discovery Program Library, Appendix E). Larger launch vehicles can be proposed if they are contributed at no cost to NASA as part of a teaming proposal. The launch service costs of the Delta II 7925 or smaller expendable launch vehicle will be funded by NASA and will not be considered within the $190 million design/development cap, but will be factored into the total mission cost.

3.1.2 General Program Guidelines

Discovery mission investigation teams must be led by a single Principal Investigator (PI) who may be from any category of domestic and nondomestic organizations, including educational institutions, industry, nonprofit institutions, NASA Centers, the Jet Propulsion Laboratory (JPL), and other Government agencies.

Teaming arrangements among universities, industry, nonprofit institutions, and/or Government agencies are encouraged. Teams are encouraged to utilize industry participation to the fullest extent reasonable. NASA field centers and the Jet Propulsion Laboratory are welcome as Discovery mission team members. However, when a NASA field center or JPL participates as a member of a Discovery mission team, it should do so because it brings unique skills, facilities, and/or capabilities to the team.

Contributions of any kind, whether cash or noncash (property and services) to Discovery mission investigations by organizations other than the Office of Space Science are welcome, but the sum of additional contributions to a given mission should not exceed approximately one-third (1/3) of the proposed cost to the Office of Space Science for the Phase C/D development of that mission or $64 million (FY 1999 dollars), whichever is less. Values for all contributions of property and services shall be established in accordance with applicable cost principles. Such contributions may be applied to any part or parts of a mission, and will not be charged against

the NASA design/development cost-cap of $190 million (FY 1999), but must be included in the calculation and discussion of the total mission costs. A letter of endorsement that contains a statement of financial commitment from each responsible organization contributing to the investigation must be submitted with the proposals for all domestic components. For nondomestic components of proposals, see Section 3.7. This Letter of Endorsement is required to assure NASA that all contributions can and will be provided as proposed.

3.2 Science Requirements

Discovery missions are intended to perform focused planetary science investigations. The relationship between the scientific objectives, the data to be returned, and the instrument payload to be used in obtaining the desired data must be unambiguous and clearly stated. Discovery investigation teams will be responsible for initial analysis of the data, its subsequent delivery to the Planetary Data System (PDS), and the publication of scientific findings and communication of results to the public. (Information on the PDS, its formats, and its requirements is included in the Discovery Program Library (DPL) discussed in Section 5.1.1.) Options for extended missions are not to be included in proposals to this AO but must be proposed separately to the research and analysis program at an appropriate time.

All science objectives and targets within planetary system(s) exploration are viable candidates for this AO and are described in documents referenced in Section 2.1, which are included in the DPL.

Every Discovery mission investigation must have both a "Baseline" mission and a "Performance Floor." The Baseline mission refers to that mission that, if fully implemented, will accomplish the entire set of scientific objectives proposed for the investigation. Any alteration that results in a reduction of the mission's ability to accomplish the Baseline set of scientific objectives as identified in the proposal will be considered a descoping of the investigation. The resulting set of achievable scientific objectives must be reviewed to ensure that the investigation remains at or above the Performance Floor. The Performance Floor is the minimum science component below which the investigation will not be considered justified for the proposed cost. The Performance Floor must be identified and documented for each proposed Discovery investigation along with plans for the prioritized descoping of mission capability from the Baseline to the Performance Floor in the event of cost or schedule growth. Failure to maintain a level of science return at or above the Performance Floor as determined by NASA will be cause for termination of the investigation.

Any samples of extraterrestrial planetary materials returned by Discovery missions shall be delivered to the NASA astromaterial curatorial facility located at NASA's Johnson Space Center (JSC); contact Dr. Douglas Blanchard, Acting Astromaterial Curator at 281-483-5151. Costs for use of this facility should be included in the total cost to NASA**.** Investigation teams will be responsible for all aspects of the delivery of such materials to the astromaterial curatorial facility. This facility will be given the task of providing for the physical security, inventory accountability, environmental preservation, and distribution of the samples in support of scientific research programs organized around each mission. For every Discovery mission investigation in which extraterrestrial planetary materials are returned to Earth, the JSC

astromaterial curatorial facility will perform sample processing in support of the mission science team. The science team shall be allocated no more than 25 percent (by mass) of the returned sample unless a larger fraction can be fully justified by the nature of the proposed investigation. The remainder shall be kept in pristine condition for research by the community at large.

If a Discovery investigation involves the operation of a flight system carrying a facility instrument or observatory during the operations phase, NASA, in cooperation with the PI, reserves the right to solicit proposals for Guest Investigators (GI's). In addition, NASA reserves the right to add GI's toward the end of the design/development phase or during operations. In the event NASA chooses to add such GI's, then NASA will assume full management and financial responsibility for these additional investigations. The PI may elect to propose a GI program as part of the investigation's data analysis program, covered by the Phase E funding. In such a case, NASA will advertise the opportunity and select participants in cooperation with the PI.

There shall be no proprietary data rights period for Discovery investigations. Discovery teams will be responsible for collecting the scientific, engineering, and ancillary information necessary to validate and calibrate the scientific data prior to depositing it in the PDS. The time required to complete this process should be the minimum necessary to provide appropriate data to the scientific community and the general public. Investigation teams must include an appropriate data analysis period independent of the PDS archiving activities as a part of their funded Phase E activities.

3.3 Education, Outreach, Technology, and Small Disadvantaged Business Requirements

The education, outreach, technology, and small disadvantaged business requirements encompass the areas described in the three following subsections.

3.3.1 Education and Outreach

The NASA Office of Space Science (OSS) has developed a comprehensive approach for making education at all levels (with a particular emphasis on pre-college education) and the enhancement of public understanding of space science, integral parts of all of its missions and research programs. The two key documents that establish the basic policies and guide all OSS Education and Outreach activities are a strategic plan entitled *Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA's Space Science Programs* (March 1995), and an accompanying implementation plan entitled *Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy* (1996). Both are available through the Discovery Program Library (see Section 5.1.1 and Appendix E) or, alternatively, can be accessed by selecting "Education and Outreach" from the menu on the OSS homepage at URL:

http://www.hq.nasa.gov/office/oss/

or from Dr. Jeffrey Rosendhal, Code S, NASA Headquarters, Washington, DC 20546-0001, USA.

In accord with these established OSS policies, all respondents of the AO must include an Education/Public Outreach (E/PO) component as a part of their overall proposal. In accord with the policies outlined in the education implementation plan referred to above, up to 2% of the total mission budget over the period of performance of the proposal may be allocated to education and outreach. OSS expects that a substantive education/outreach program will be an integral element of every selected mission and that adequate resources will be devoted by proposers to the planning and implementation of such an effort. Proposed activities may also include public information programs that will inform the public through mass media or other means, or utilize other innovative ideas for bringing space science to the public. Proposals must include the PI's approach for planning an education/outreach program, arranging for appropriate partners and alliances, implementing the education/outreach program (including appropriate evaluation activities) , and plans for disseminating education/outreach products and materials. Costs for such activities must be included as a part of mission planning, development, and operations costs.

See Appendix C for a detailed discussion of evaluation criteria for E/PO proposals. Appendix C also provides information on the assistance available to develop E/PO proposals.

3.3.2 Technology

NASA seeks to infuse new technologies into its programs and to strengthen the mechanisms by which it transfers such technologies to the private sector, including the nonaerospace sector. The means by which NASA's Office of Space Science plans to implement new technology is described in the *Office of Space Science Integrated Technology Strategy*, which is included in the DPL described in Section 5.1.1. The Discovery Program represents an opportunity for NASA to develop and test new technologies and applications, as well as strengthen existing technology transfer mechanisms and explore and implement new mechanism and approaches to economic benefit. Investigations dependent on new technology will not be penalized for risk if adequate backup plans are described to ensure success of the investigation.

3.3.3 Small Disadvantaged Business and Minority Institutions

The PI and team members shall agree to use their best efforts to assist NASA in achieving its goal for the participation of small disadvantaged businesses, women-owned small businesses, Historically Black Colleges and Universities, and other Minority Educational Institutions in NASA procurements. Investment in these organizations reflects NASA's commitment to increase the participation of minority concerns in the aerospace community, and is to be viewed as an investment in our future. Offerors, other than small business concerns, are also advised that contracts resulting from this AO will be required to contain a subcontracting plan that includes goals for subcontracting with small, small disadvantaged, and women-owned small business concerns. (See Appendix A, Section XIII.)

3.4 Technical Approach Requirements

Discovery missions must encompass all technical aspects of the investigation from the preliminary analysis and technical definition (Phase A/B) through delivery of the data to the PDS and their analysis (the final part of the operations phase, Phase E). NASA Handbook NHB 7120.5 *Management of Major System Programs and Requirements* delineates activities, milestones, and products typically associated with each of these phases and may be used as a reference in defining a team's mission approach. NASA Handbook 7120.5 is included in the DPL (see Section 5.1.1). Mission teams have the freedom to use their own processes, procedures, and methods, and the use of innovative processes is encouraged when cost, schedule, and technical improvements can be demonstrated.

The investigation shall have a product assurance program that is consistent with the ISO 9000 series, American National Standard, *Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing*, ANSI/ASQC Q9001-1994 (see Appendix E).

Radioisotope Thermal Generators (RTG's) are **not** permitted on Discovery missions proposed to this AO. Other, smaller radioactive sources (such as radioactive heating units or instrument calibration sources) are permitted.

Investigation teams are welcome to use currently available NASA navigation, tracking, control, communications, and other services. Non-NASA capabilities may also be used if they are technically appropriate and cost effective. The costs for such services, whether obtained from NASA or from other sources, **must** be included in the cost estimate. Cost information for NASA provided services (Deep Space Network, Advanced Multi Mission-Operation System) is provided in the DPL (See Appendix E).

3.5 Management Requirements

NASA intends to give the Principal Investigator and his/her team the ability to use their own management processes, procedures, and methods to the fullest extent possible. Discovery mission teams should define the management approach best suited for their particular teaming arrangement. This approach should be commensurate with the investigation's implementation approach**,** while retaining a simple and effective management structure that assures adequate control of development within the cost and schedule constraints. The investigation team should develop a Work Breakdown Structure (WBS) that best fits its organizational approach and mission design concept.

The PI is expected to be the central person in charge of each Discovery mission investigation, with full responsibility for the scientific integrity of the investigation. The PI is responsible for assembling a team to propose and implement a Discovery mission. The PI is accountable to NASA for the scientific success of the investigation and must be prepared to recommend mission termination when, in the judgment of the PI, the successful achievement of established minimum

science objectives, as defined in the proposal as the Performance Floor, is not likely within the committed cost and schedule reserves.

In accordance with NASA's transfer of program management responsibility to its Centers, Discovery mission program management responsibilities will be assigned to an appropriate Center. The Center's responsibilities will include mission implementation oversight; coordination of Government-furnished services, equipment, and facilities; and contract management of selected investigations. In addition, the designated Center may conduct independent reviews coincident with major program reviews, such as preliminary design review or the critical design review.

Each Discovery investigation must have a Project Manager (PM) who will oversee the technical implementation of the mission. The role, qualifications, and experience of the PM should be adequate to ensure that the technical and managerial needs of the investigation will be met.

Every Discovery investigation must also define the risk management approach it intends to use to ensure successful achievement of the mission objectives within established resource and schedule constraints. Included in this discussion of risk management should be risk mitigation plans for new technologies and the need for any long-lead items that need to be placed on contract before the start of Phase C/D, to ensure timely delivery. In addition, any manufacturing, test, or other facilities needed to ensure successful completion of the proposed investigation should be identified in every Discovery proposal.

3.6 Cost Requirements

A major goal of designing a Discovery mission investigation is to reach a balance between science return and total cost in order to provide the highest science value for cost. Proposers must estimate both the total mission cost (TMC) and the NASA portion of the TMC in the proposal and in the concept study. The NASA portion of the TMC (equivalent to TMC minus the cost of all contributions) will be one factor in the selection of missions and in the continuing assessment of ongoing missions. The specific cost information required for the proposals to be submitted in response to this AO and for the concept study for selected proposals are contained in Appendices B and G, respectively. Since cost details are not anticipated until the conclusion of the concept study, cost estimates in the proposal may be generated with models or cost estimating relationships from analogous missions. However, the proposed cost to NASA shall not increase by more than 20% from the proposal to the concept study and must not exceed the Discovery Program cost constraints. Since costs and obligation authority may well be different, it is incumbent on the proposer to define any obligation requirement which exceed planned costs.

The funding profile for the NASA portion of the TMC for proposed investigations must fit within the funding availability for the Discovery program defined in Appendix I. Once established at the end of the concept study, the estimated cost baseline must assure adequate funding to meet cost-to-complete requirements. This includes the identification of credible, phased reserves proportional to the development risk. The Discovery Program does not maintain a reserve pool from which investigations exceeding their cost commitments may draw.

The TMC is defined as all costs that are necessary to complete the investigation incurred after the downselection from the concept studies. This covers all costs in Phases A/B through E, including reserves, contributions, and contract fees. In general, proposers should assume all costs must be included unless specifically excluded. Examples of costs to be included are: launch vehicles and any upper stages; launch services; education and outreach activities; new technology infusion and transfer; subcontracting costs (including fees); science teams; all personnel required to conduct the investigation, analyze and publish results, and deliver data in archival format to the PDS; insurance; NASA Deep Space Network (DSN) support, if required (see Mission Operations and Communications Services Information Summary document in the DPL, Appendix E); Navigation and Ancillary Information Facility (NAIF) services; NASA curatorial support (if required; see Section 3.2); and all labor (including contractor and civil servant).

NASA civil service labor and supporting NASA Center infrastructure must be costed on a full cost accounting basis. If NASA guidance for full cost accounting has not been fully developed by the closing date for proposal submission or for completion of the concept studies, NASA Centers may submit full cost proposals based on the instructions in the NASA Financial Management Manual, Section 9091-5, Cost Principles for Reimbursable Agreements. If any NASA costs are to be considered as contributed costs, the contributed item(s) must be separately funded by an effort complementary to the proposed investigation, and the funding sources must be identified. Other Federal Government elements of proposals must follow their agency cost accounting standards for full cost. If no standards are in effect, the proposers must then follow the Managerial Cost Accounting Standards for the Federal Government as recommended by the Federal Accounting Standards Advisory Board.

The cost of contributed hardware should be estimated as either: (1) the cost associated with the development and production of the item if this is the first time the item has been developed and if the mission represents the primary application for which the item was developed; or (2) the cost associated with the reproduction and modification of the item (i.e., any recurring and mission-unique costs) if this is not a first-time development. If an item is being developed primarily for an application other than the one in which it will be used in the proposed investigation, then it may be considered as falling into the second category (with the estimated cost calculated as that associated with the reproduction and modification alone). The cost of contributed labor and services should be consistent with rates paid for similar work in the offeror's organization. The cost of contributions does not need to include funding spent before the start of the investigation (before completing a contract with NASA). The value of materials and supplies shall be reasonable and shall not exceed the fair market value of the property at the time of the contribution.

3.7 International Participation

Recognizing the potential scientific, technical, and financial benefits offered to all partners by international participation, participation by non U.S. individuals and organizations as team members in Discovery Program investigations is encouraged. Participation may include, but is not limited to, the contribution of scientific instruments, the spacecraft (or a portion thereof) and the subsequent sharing of the data from the mission, all on a no-exchange-of-funds basis. Launch

vehicles and launch services may also be contributed by international partners but, unlike other contributions, are not subject to the "one-third" limit. However, they should be included in all calculations and discussions of the total mission costs.

The direct purchase of goods and/or services from nondomestic sources is permitted with the following restriction: NASA will not purchase non U.S. launch vehicles for Discovery missions, nor may funds provided to a Discovery mission team be used to purchase a launch vehicle from a non U.S. source. The provision of launch services as a contribution to a Discovery mission by a nondomestic partner is acceptable only on a no-exchange-of-funds basis (i.e., at no cost to NASA). Only those nondomestic launch vehicles with demonstrated reliabilities of 90% or greater may be proposed.

Potential Discovery participants are advised that a contract or subcontract using funds derived from NASA, by a U.S. team with a non U.S. participant must meet NASA and Federal regulations and that these regulations will place an additional burden on investigation teams that should be explicitly included in discussions of the investigation's cost, schedule, and risk management. Information regarding regulations governing the procurement of foreign goods or services is provided in Appendix D.

Any proposed international participation must be described at the same level of detail as that of domestic partners. This includes the provision of full cost, schedule, and management data in the proposal and in subsequent reviews. Failure to document all cost and schedule data, management approaches and techniques, or failure to document the commitment of all team partners to those costs and schedules may cause a proposal to be found unacceptable.

Participation by nondomestic individuals and/or institutions as team members or contributors to Discovery investigations must be endorsed by the institutions and governments involved. The letter of endorsement will provide evidence that the institution and government officials are aware and supportive of the proposed investigation and will pursue funding for the investigation upon selection. The endorsement must be submitted per the schedule in Section 1.3.

4.0 MISSIONS OF OPPORTUNITY BACKGROUND, CONSTRAINTS, GUIDELINES, AND REQUIREMENTS

4.1 Missions of Opportunity Background and Constraints

By funding U.S. participation in Missions of Opportunity, NASA seeks to bring the capabilities of the U.S. scientific community to bear on missions conducted as part of a non-NASA space program. Typically such missions are sponsored by non-U.S. governments, although missions from other U.S. agencies or private sector organizations are equally qualified.

For Missions of Opportunity, the proposer offers to participate in a non-NASA mission that is planned or that has been approved by its sponsoring organization. Such participation could take many forms, such as providing a complete science instrument, hardware components of a science instrument, or expertise in critical areas of the mission. NASA will evaluate the proposed

investigation, not the sponsor's entire mission. While the investigator is not required to document the entire mission of the sponsor, the U.S. investigator must fully document their complete investigation in the proposal.

Note that selection by NASA through this AO does not constitute selection of the investigation as part of the mission, which necessarily is a decision made by the sponsor of the mission. Instead, selection is a commitment by NASA to fund the U.S. portion of the investigation as part of the Discovery program, although funding beyond basic studies does not begin until detailed design of the mission itself is underway. If an investigation is selected both by NASA and by the mission sponsor, the PI is responsible to NASA for the scientific integrity and the management of the PI's contribution to the mission.

A selected investigation may result in a contract, a grant, or a cooperative agreement, depending on the nature of the proposal and the institutions involved. For this AO, a deviation is granted by the NASA Office of Procurement that allows a commercial firm to be awarded a grant (with no requirement for NASA involvement in and contribution to the technical aspects of the investigation) provided that the commercial firm contributes at least 50% of the total resources required to accomplish the effort. Further information on grants and cooperative agreements is contained in NASA Handbook NPG 5800.1D, entitled, *Grant and Cooperative Agreement Handbook*, dated July 23, 1996, available from the Discovery Program Library (see Appendix E).

A selected Mission of Opportunity investigation will be expected to submit a concept study report to NASA for detailed review. This report will conclude with a commitment by the PI for the cost, schedule, and scientific performance of the investigation. If, at any time, this commitment appears to be in jeopardy, the investigation will be subject to cancellation. Like other missions proposed to this AO, the NASA funding is subject to cancellation if there is a cost overrun charged to NASA for any reason, including a launch delay caused by the non-NASA partner.

A technical and programmatic review will be held prior to the start of phase C/D. Assuming a positive outcome, NASA will confirm the investigation to proceed to development. As a condition for confirmation, the organization sponsoring the full mission must make a commitment to enter into an appropriate agreement with NASA that shall include provisions for sharing of flight data.

4.2 General Guidelines for Missions of Opportunity

Missions of Opportunity are generally conducted on a no-exchange-of-funds basis between NASA and the mission sponsor.

4.3 Science Requirements

Mission of Opportunity investigation teams will have data analysis responsibilities defined by the policies of the mission sponsor; nevertheless, NASA expects that the mission sponsor will enter into an agreement with NASA to assure that data returned from at least those aspects of the

mission in which NASA support is involved, if not the entire mission, will be made available to the U.S. scientific community in a timely way.

4.4 Cost and Schedule Requirements for Missions of Opportunity

It is incumbent on the proposing investigator to provide evidence in his/her proposal that the sponsoring organization intends to fund the mission and that the endorsement of NASA for U.S. participation is required by the sponsoring organization prior to December 31, 1999. The launch date is not constrained. If a commitment from NASA is not needed by the sponsoring organization before December 31, 1999, then the proposal should be submitted to a subsequent Discovery program AO.

The level of funding available for each proposal will be decided on a case-by-case basis. NASA's funding for a selected investigation's concept study will be limited to $375K (in real year dollars). Participation by internationals will be on a no-exchange-of-funds basis. Follow-on work prior to selection by the mission's sponsoring organization will be limited to $100K (in real year dollars), and the limit for all studies prior to the initiation of mission detailed design (Phase C) is 25% of the total NASA commitment for funding of the investigation. The PI assumes all risk for delays in the mission and should propose appropriate reserves.

Proposers must estimate the total NASA Cost in the proposal. The specific cost information required for proposals is contained in Appendix B.

During the concept study, the NASA cost shall not increase by more than 20% from that offered in the original proposal and must not exceed the NASA cost caps. Thereafter, cost shall not increase from that offered in the proposal resulting from the concept study.

Each mission’s concept study must conclude with a commitment by the proposer for the cost, schedule, and scientific performance of the investigation. If, at any time, the cost, schedule, or scientific performance commitments appears to be in jeopardy, the investigation will be subject to cancellation. The Discovery program does not maintain a reserve pool from which investigations exceeding their cost commitments may draw.

5.0 PROPOSAL PREPARATION AND SUBMISSION

5.1 Preproposal Activities

5.1.1 Discovery Program Library

The Discovery Program Library (DPL) is intended to provide additional background technical and management information. Information is included on the Discovery Program, science goals, launch vehicles, Deep Space Network capabilities, NASA's technology transfer infrastructure, the Office of Space Sciences' Integrated Technology Strategy, the Office of Space Science’s Education and Public Outreach Strategy, the PDS, and existing NASA test and mission

operations facilities. The contents of the DPL are listed in Appendix E. This library is accessible on the World Wide Web at the following address:

http://discovery.larc.nasa.gov/discovery/dpl.html

If necessary, hard copies of selected documents may be obtained by written request to Mr. George Albright or Dr. Jay Bergstralh at the addresses below**.**

5.1.2 Technical and Scientific Inquiries

Inquiries of a technical nature should be directed to Mr. George Albright, and inquiries of a scientific nature should be directed to Dr. Jay Bergstralh at their respective addresses below:

Mr. George Albright
Mission and Payload Development Division
Code SD
Ref. Discovery 98
National Aeronautics and Space Administration
Washington, DC 20546

Fax Number: 202-358-3987
E-mail: ossao@hq.nasa.gov
note: E-mail subject field must include the character string "DISCAO"
Phone: (202) 358-0356

Dr. Jay Bergstralh
Discovery Program Scientist
Code SR
Ref. Discovery 98
National Aeronautics and Space Administration
Washington, DC 20546

Fax Number: 202-358-3097
E-mail: jay.bergstralh@hq.nasa.gov
Phone: (202) 358-0313

5.1.3 Preproposal Conference

A preproposal conference will be held on April 7, 1998, at the:

Lunar and Planetary Institute
3600 Bay Area Boulevard
Houston, TX 77058

Attendees are to attend at their own expense and to make their own travel arrangements. The purpose of this conference will be to address questions about the proposal process for this AO. The preproposal conference will address all those questions received by NASA on or before March 30, 1998. Questions should be addressed to Mr. George Albright at the address given in Section 5.1.2. Additional questions submitted after this date, including those provided in writing at the conference, may be addressed at the conference only as time permits. Anonymity of the authors of questions will be honored if requested. A Discovery AO Preproposal Conference Transcript, including answers to all questions addressed at the conference, and minutes of the conference, will be prepared and mailed approximately two (2) weeks after the conference to

attendees, to those submitting letters of intent (see section 5.1.4), and to anyone who submits a request for this document to Mr. George Albright via fax or electronic mail.

5.1.4 Notice of Intent to Propose

To assist NASA's planning of the proposal evaluation process, a Notice of Intent should be submitted by all prospective proposers by **April 20, 1998.** This Notice MUST be submitted **electronically** using the form found on the World Wide Web at:

http://cass.jsc.nasa.gov/panel/

Proposers without access to the Web or who have technical difficulty accessing the Web site should contact the Lunar and Planetary Institute by E-mail at discpanel@lpi.jsc.nasa.gov or by phone at 281-486-2156 or 281-486-2166 for assistance.

To the extent the following information is known by April 20, 1998, the Notice of Intent should include the following:

(a) Name, address, telephone number, fax number, E-mail address and affilitiation of the Principal Investigator.

(b) Full names and affiliations of each of the following:

(1) co-investigators; (2) lead representative from each organization (industrial, academic, not-for-profit, and/or federal) included in the team. If any co-investigators or team members are from nondomestic institutions, the mechanism by which these people will be funded should be identified in the comments box on the form.

(c) A brief statement (150 words or less) for each of the following:

(1) The scientific objectives of the proposed mission.

(2) Identification of new technologies that may be employed as part of the mission.

(3) The education/public outreach objectives in the proposed investigation.

Material in a Notice of Intent is for NASA planning purposes only, is confidential, and is not binding on the submitter. See the special notice below however.

SPECIAL NOTICE: As a result of recent AO's for complete mission investigations such as this one, commercial aerospace and technology organizations have requested access to the names and addresses of those who submit NOI's in order to facilitate informing potential proposers of their services and/or products. As an experiment and at the option of the submitters of a NOI, NASA OSS is willing to offer this service with the understanding that the Agency takes no responsibility for the use of such information.

Therefore, all those submitting an NOI in response to this AO are requested to include the appropriately edited form of the following material (note: this material is included in the format of the NOI for those submitting electronically via the World Wide Web).

> "By submitting this Notice of Intent to propose, I hereby do / do not authorize NASA to post my name and institutional address (but not the name of my intended proposal) as an addendum to this AO on the World Wide Web starting approximately one week after the NOI due date. If I do authorize such a posting, I understand that such information will be in the public domain, and I will not hold NASA responsible for any use made by others for revealing this information."

5.2 Format and Content of Proposals

General NASA guidance for proposals to this AO is given in Appendix A, which is considered binding unless specifically amended in this AO. A uniform proposal format is required from all proposers to aid in proposal evaluation. The required proposal format and contents are summarized in Appendix B. Failure to follow this outline may result in reduced ratings during the evaluation process and could lead to rejection of the proposal without review. General information and further proposal preparation information are provided as Appendices to this AO.

5.3 Submission Information

5.3.1 Certification

The original copy of all proposals shall include a letter of endorsement signed by an institutional official from each partner and each organization expecting to contribute hardware, software, facilities, services, etc. This official must certify institutional support and sponsorship of the investigation, as well as concurrence in the management and financial parts of the proposal. Nondomestic organizations may submit such endorsements up to the date in the schedule in Section 1.3. Additional certifications identified in Appendix F are required by law and must be included with the original, signed proposal.

5.3.2 Cover Page and Proposal Summary

All proposers MUST submit **electronically** a **Cover Page and Proposal Summary** via the forms found at the World Wide Web site:

http://cass.jsc.nasa.gov/panel/

See Appendix B for a listing of the information that will be required on these forms. Proposers without access to the Web or who experience technical difficulty accessing the Web site should contact the Lunar and Planetary Institute by e-mail at discpanel@lpi.jsc.nasa.gov or by phone at 281-486-2156 or 281-486-2166 for assistance.

Once the submit button has been clicked, the system will respond with a confirmation screen. This screen will give the Confirmation Number to be used as an identifier for the proposal and will provide an opportunity for printing out the Cover Page and Proposal Summary. **A hard-copy printout of the completed Cover Page containing the Confirmation Number MUST be used to secure the required original PI and institutional signatures; this printout then constitutes the first page of the submitted original proposal**. (Note: The printed version of Cover Page with original signatures is required for issuing awards in the event that the proposal is selected for funding.) In addition, copies of the signed Cover Page containing the Confirmation Number must be attached to the front of ALL the required number of proposal copies. **These pages, therefore, must be electronically submitted prior to the proposal deadline of June 22, 1998, to allow ample time to obtain necessary signatures.**

A hard-copy printout of the Proposal Summary submitted via the Web constitutes the second page of all copies of the proposal. It is NASA's intention that the PI name, institution, and Proposal Summary for all selected proposals will be posted on a publicly accessible site. Therefore, the Proposal Summary should not contain any proprietary or confidential information that the PI wishes to protect from public disclosure.

In addition to receiving a Confirmation Number after the submit button has been clicked, the proposer will receive a password that is unique to the submission of the proposal. To make any necessary changes to the information that was electronically submitted, the proposer must use the assigned password. After the proposal deadline, the password will be deactivated, and no further changes can be made.

Note: Electronic receipt of the Cover Page and Proposal Summary is NOT sufficient to meet the deadline for proposal submission. **The original proposal, with the original signed Cover Page with Confirmation Number, Proposal Summary, and required number of copies of the proposal must be received at the Lunar and Planetary Institute by June 22, 1998.**

5.3.3 Quantity

All proposers must provide 35 copies of their proposal, including the original signed proposal, on or before the proposal deadline.

5.3.4 Submittal Address

All proposals must be received at the following address by June 22, 1998:

Discovery Science Peer Review Panel
Lunar and Planetary Institute
3600 Bay Area Boulevard
Houston, TX 77058-1113
Phone: 281-486-2166
Fax: 281-486-2160
E-mail: discpanel@lpi.jsc.nasa.gov

Additionally, one copy (over and above the 35 copies) of any proposal that includes any nondomestic participants, nondomestic letters of endorsement, and/or institutional and governmental commitments should be sent to Ms. Bettye Jones at the address listed below:

Ms. Bettye Jones
Space Science and Aeronautics Division
Ref. Discovery 98
National Aeronautics and Space Administration
Washington, DC 20546
USA
Phone: 202-358-0900
Fax: 202-358-3029

5.3.5 Deadline

All proposals must be received at the address above by the closing date specified in Section 1.3. All proposals received after the closing date will be treated in accordance with NASA's provisions for late proposals (FAR Supplement 1815.412, Paragraphs a and b).

5.3.6 Notification of Receipt

NASA will notify the proposers in writing that their proposals have been received. Proposers not receiving this confirmation within two weeks after submittal of their proposals should contact Mr. George Albright at the address given in Section 5.1.2.

6.0 PROPOSAL EVALUATION, SELECTION, AND IMPLEMENTATION

6.1 Evaluation and Selection Process

All proposals will be subjected to a preliminary screening to determine their responsiveness to this AO. Proposals that are not in compliance with the constraints, requirements, and guidelines of this AO will be considered to be unacceptable and returned to the proposer.

The remaining proposals will then be assessed by an evaluation team composed of panels of individuals who are peers of the proposers in scientific, technical, and other areas. The evaluations will be done in accordance with the criteria specified in Section 6.2.

After these evaluations, the panels will meet to consider the total qualitative and/or quantitative aspects of the evaluations in order to integrate the separate panel results, as necessary, to assure consistency and fairness in evaluations. If during these deliberations the evaluators need clarification on a proposal, a designated member of the evaluation team may contact the proposer to ask for clarification. At the preproposal conference, proposers will be notified of the period when questions may be expected.

Once these evaluations have been completed and integrated, a committee, composed of civil servants who have served on the panels, will convene to consider the peer review results. This committee may also prepare questions of clarification for the proposers if information in the proposal is not sufficiently clear. The committee will review the answers to any questions and then finalize evaluations. Based on this information, the committee will then categorize proposals in accordance with the category definitions in NASA FAR Supplement 1872.403. However, missions of differing sizes and costs will be categorized equivalently.

The results of the evaluations and categorizations will be presented to the Space Science Steering Committee (SSSC), composed of civil service personnel from the Office of Space Science (OSS), for an independent review of the evaluation and categorization process. After this review, the final evaluation results will be forwarded to the Associate Administrator for the Office of Space Science who will make the selection(s). Those proposers not selected will be notified by letter and will be offered a debriefing. Proposers selected will be notified by letter and provided instructions for conducting their concept studies.

The Associate Administrator for Space Science may use a wide range of planning and policy considerations when selecting among top ranked proposals. Proposers should recognize that the Office of Space Science program planning is an evolving activity, dependent upon Administration policies and budgets, as well as planetary exploration objectives and priorities that can change with time. The Office of Space Science develops and evaluates the program strategy in consultation with the scientific community directly and via advisory groups such as NASA's Solar System Exploration Subcommittee (SSES) and the National Academy of Sciences' Committee on Planetary and Lunar Exploration (COMPLEX).

6.2 Evaluation Criteria

Successful implementation of the Discovery Program requires, in addition to scientific merit, that the investigations be achievable within established boundary conditions of cost and schedule. The evaluation approach is designed to determine the mission with the best combination of science, likelihood that the proposed science investigation can be achieved, low cost, and contribution to broader NASA and space science goals. In order to accomplish this objective, Appendix B requests specific information that will be used to establish the scientific merit of the investigation, the feasibility of the science investigation, the feasibility of implementing the mission, the cost for each proposal, and the value of the contribution to broader NASA goals.

6.2.1 Evaluation Criteria for Proposals

The criteria defined in this section will be used to evaluate each proposal. The five criteria are:

- The scientific merit of the investigation
- The total mission cost to NASA
- The technical merit and feasibility of the science investigation
- The feasibility of the mission implementation scheme
- Education, Outreach, Technology (infusion and transfer), and Small Disadvantaged Business activities

The scientific merit criterion will be given the greatest weight in the evaluation. The total mission cost to NASA will also be an important criterion, but will be given lower weight than scientific merit. The remaining three criteria will be given still lower, and approximately equal, weighting.

6.2.1a Scientific Merit of the Investigation

The science information requested in the proposal will be used to evaluate each investigation on its scientific merit. To evaluate the intrinsic scientific merit, the investigation goals and objectives will be compared with the planetary science community's latest recommendations to determine the impact of the mission on science as a whole and, in particular, on the U.S.' planetary science program (see goals in Section 2.1). This evaluation will include how well the mission fills important knowledge gaps or provides for fundamental progress in a subdiscipline, whether or not it provides ancillary benefits to science, and how well the mission supports or overlaps ongoing missions. The scientific value of the Performance Floor (see Section 3.2) will also be assessed as part of the determination of the overall scientific merit of the investigation. This evaluation will result in a number and/or adjective score of the scientific merit of the investigation.

6.2.1b Total Mission Cost to NASA

Although it will be weighted less than the scientific merit, the proposed total cost to NASA of the investigation will be a significant consideration in the evaluation of the proposals. As noted below, an assessment of the feasibility of completing the investigation within the estimated cost (i.e, realism of cost) will be part of the evaluation of feasibility of mission implementation.

6.2.1c Technical Merit and Feasibility of the Science Implementation

Each investigation will be evaluated for its technical merit, feasibility, resiliency, and the probability of success. Technical merit and feasibility will be evaluated by assessing the degree to which the mission will address the proposed scientific goals and objectives and the degree to which the instrument set can provide the necessary data. The data analysis and archiving plan will be assessed; consideration of whether the data gathered will be sufficient to complete the scientific investigation will be a factor in this assessment. The timeliness of releasing the data to the public domain will be another factor. Resiliency will be evaluated by assessing the approach to descoping the Baseline mission to the Performance Floor in the event that development problems force reductions in scope. Finally, the probability of success will be evaluated by assessing the experience, expertise, and organizational structure of the science team and the technical risk associated with the mission design and the instrument set. This evaluation will result in a number and/or adjective score of the technical merit and feasibility of the scientific investigation.

6.2.1d Feasibility of the Mission Implementation Scheme

The technical approach, management approach, realism of cost, and Phase A/B plans will be evaluated on the basis of the likelihood that the mission can be implemented as proposed. Since it is recognized that teaming arrangements for implementing the mission may not be complete before the proposal closing date (see Section 1.3), proposers will not be penalized if the proposal indicates only candidate (but credible) implementation approaches for the spacecraft, launch vehicle, communications, and ground systems that will allow successful implementation of the mission. This evaluation will consider implementation factors such as the mission design and the proposers' understanding of the processes, products, and activities required to accomplish development and integration of all elements (e.g., flight systems, ground and data systems, etc.) and the adequacy of the proposed approach, the organizational structure, the roles and experience of the known partners, the management approach, the commitments of partners and contributors, the team's understanding of the scope of work (covering all elements of the mission, including contributions) and the relationship of the work to the project schedule, the project element interdependencies and associated schedule margins. Investigations dependent on new technology will not be penalized for risk if adequate backup plans are described to ensure success of the investigation. The likelihood of completing the proposed investigation within the proposed cost (i.e., realism of cost) will also be assessed. The proposal must discuss the methods and rationale (e.g., cost models, cost estimating relationships of analogous missions, etc.) used to develop the estimated cost, and must include a discussion of cost risks. Innovative cost effective features,

processes, or approaches will be rewarded if proven sound. Based on the items described above, each proposal will be evaluated as either, high, medium, or low risk.

6.2.1e Education, Outreach, Technology, and Small Disadvantaged Business

The education, outreach, technology, and small disadvantaged business activities described in the proposal will be rated by evaluating the degree to which they meet the program requirements in each of these areas. These requirements are described in Section 3.3.

6.3 Implementation Activities

6.3.1 Notification of Selection

Following selection, the PI's of the selected investigations will be notified immediately by telephone, followed by formal written notification. The formal notification will include: any issues noted during the evaluation that may require resolution, the Center assigned program and contract management responsibility, and any other special instructions for the concept study. Proposers of investigations that were not selected will be notified in writing and offered oral debriefings for themselves and a representative from each of their main partners (if any).

6.3.2 Contract Administration and Fundin

Different mission management approaches and organizational arrangements will require different contract administration and funding arrangements. Each PI, in his or her proposal, is expected to recommend, as part of the teaming arrangement, the organizations and contract mechanisms NASA should use in awarding work to the team. Cost type contracts with incentives are strongly encouraged, particularly where performance incentives are measured based on delivery of calibrated/validated science data products. It is anticipated that contracts will be awarded for concept studies for the four to six missions selected as a result of this AO, with options for the follow-on mission phases (Phase A/B, Phase C/D, and Phase E).

NASA will provide approximately $375K to each selected investigation to perform a four-month concept study, to be initiated as soon as possible after notification. The product of these studies will be reports to be delivered on the date specified in Section 1.3. The contents and format of the concept study reports are specified in Appendix G. NASA may request presentations and/or site visits to review the concept study results with the investigation teams. The concept studies are intended to provide NASA with more definitive information regarding the cost, risk, and feasibility of the investigations before final selection(s) for implementation. As a result of evaluation of the concept studies, NASA expects to downselect to one or more investigations to proceed to Phase A/B by exercising contract options of the selected investigation(s). In no case, however, is NASA required to exercise any option.

6.3.3 Downselection of Investigations

The downselection decision will be made by the Associate Administrator for Space Science, based upon review of the concept study results and current programmatic considerations. The criteria presently being considered for evaluating the concept study are described in Appendix H. The scientific, technical, management, cost and other aspects of the concept study will be assessed by a panel composed of individuals who are experts in each of the areas to be evaluated. The evaluation of the concept study for each investigation will be similar to the proposal evaluation but will consider the additional detailed information provided. The evaluation will include a reexamination of the scientific merit of the investigation should any modifications be introduced as a result of the concept study, the total cost to NASA, the technical merit and feasibility of the science investigation, and the feasibility of implementing the mission. A complete assessment of the technical approach, the management, the Phase A/B plans, and the cost risk will be integrated to evaluate the probability that the implementation approach will support the science objectives. In addition, an evaluation of Education, Outreach, Technology, and Small Disadvantaged Business plans and the NASA portion of the total mission cost will be coupled with the scientific merit to derive a figure of merit for the overall value of the investigation and thence its value for cost to NASA.

6.3.4 Confirmation of Investigations for Subsequent Phases

At the completion of the Phase A/B study (i.e., at the Preliminary Design Review), an independent review team will conduct a Confirmation Review. Based on the results of this review, the Associate Administrator for Space Science will decide whether or not to confirm the mission for design/development (Phase C/D). This decision will be based upon review of the Phase A/B results and programmatic considerations.

7.0 CONCLUSION

The Discovery Program continues to represent a challenging new way for NASA to accomplish important scientific exploration of planetary systems. It provides an opportunity for frequent flights to execute science investigations at the forefront of planetary science, as well as generate opportunities to enhance education initiatives and engage the public in the excitement of science discoveries. NASA invites both the U.S. and international science communities to participate in proposals for Discovery missions and Missions of Opportunity to be carried out as a result of this Announcement.

Alan N. Bunner
Science Program Director
Structure and Evolution of the Universe

Carl B. Pilcher
Acting Science Program Director
Solar System Exploration

Edward J. Weiler
Science Program Director
Astronomical Search for Origins
and Planetary Systems

George L. Withbroe
Science Program Director
The Sun-Earth Connection

Wesley T. Huntress, Jr.
Associate Administrator
for Space Science

APPENDIX A

GENERAL INSTRUCTIONS AND PROVISIONS

I. INSTRUMENTATION AND/OR GROUND EQUIPMENT

By submitting a proposal, the investigator and institution agree that NASA has the option to accept all or part of the offeror's plan to provide the instrumentation or ground support equipment required for the investigation, or NASA may furnish or obtain such instrumentation or equipment from any other source as determined by the selecting official. In addition, NASA reserves the right to require use of Government instrumentation or property that subsequently becomes available, with or without modification, that meets the investigative objectives.

II. TENTATIVE SELECTIONS, PHASED DEVELOPMENT, PARTIAL SELECTIONS, AND PARTICIPATION WITH OTHERS

By submitting a proposal, the investigator and the organization agree that NASA has the option to make a tentative selection pending a successful feasibility or definition effort. NASA has the option to contract in phases for a proposed experiment, and to discontinue the investigative effort at the completion of any phase. NASA may desire to select only a portion of the proposed investigation and/or that the individual participates with other investigators in a joint investigation. In this case, the investigator will be given the opportunity to accept or decline such partial acceptance or participation with other investigators prior to a NASA selection. Where participation with other investigators as a team is agreed to, one of the team members will normally be designated as its leader or contact point. NASA reserves the right not to make an award or cancel this AO at any time.

III. SELECTION WITHOUT DISCUSSION

The Government intends to evaluate proposals and award contracts without discussions with offerors. Therefore, each initial offer should contain the offeror's best terms from a cost or price and technical standpoint. However, the Government reserves the right to conduct discussions, if later determined by the Contracting Officer to be necessary.

IV. NONDOMESTIC PROPOSALS

The guidelines for proposals originating outside of the United States are the same as those for proposals originating within the United States, except that the additional conditions described in Sections 3.7 shall also apply.

V. TREATMENT OF PROPOSAL DATA

It is NASA policy to use information contained in proposals and quotations for evaluation purposes only. While this policy does not require that the proposal or quotation bear a restrictive notice, offerors or quoters should, in order to maximize protection of trade secrets or other information that is commercial or financial and confidential or privileged, place the following notice on the title page of the proposal or quotation and specify the information, subject to the notice by inserting appropriate identification, such as page numbers, in the notice. In any event, information (data) contained in proposals and quotations will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

RESTRICTION ON USE AND DISCLOSURE OF
PROPOSAL AND QUOTATION INFORMATION (DATA)

> The information (data) contained in (insert page numbers or other identification) of this proposal or quotation constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed for other than evaluation purposes; provided, however, that in the event a contract is awarded on the basis of this proposal or quotation, the Government shall have the right to use and disclose this information (data) to the extent provided in the contract. This restriction does not limit the Government's right to use or disclose this information (data), if obtained from another source without restriction.

VI. STATUS OF COST PROPOSALS

Submission of a Standard Form (SF) 1411 Contract Pricing Proposal Cover Sheet for the Phase A Concept Study is not required. The SF 1411 is required for all contract options after the concept study. The investigator's institution agrees that the cost proposal submitted in response to the Announcement is for proposal evaluation and selection purposes, and that, following selection and during negotiations leading to a definitive contract, the institution may be required to resubmit or execute all certifications and representations required by law and regulation.

VII. LATE PROPOSALS

The Government reserves the right to consider proposals or modifications thereof received after the date indicated for such purpose, if the selecting official deems it to offer NASA a significant technical advantage or cost reduction. (See NFS 18-15.412.)

VIII. SOURCE OF SPACE INVESTIGATIONS

Investigators are advised that candidate investigations for space missions can come from many sources. These sources include those selected through the AO, those generated by NASA in-house research and development, and those derived from contracts and other agreements between NASA and external entities.

IX. DISCLOSURE OF PROPOSALS OUTSIDE THE GOVERNMENT

NASA may find it necessary to obtain proposal evaluation assistance outside the Government. Where NASA determines it is necessary to disclose a proposal outside the Government for evaluation purposes, arrangements will be made with the evaluator for appropriate handling of the proposal information. Therefore, by submitting a proposal, the investigator and institution agree that NASA may have the proposal evaluated outside the Government. If the investigator or institution desires to preclude NASA from using an outside evaluation, the investigator or institution should so indicate on the cover. However, notice is given that if NASA is precluded from using outside evaluation, it may be unable to consider the proposal.

X. EQUAL OPPORTUNITY

For any NASA contract resulting from this solicitation, the clause at FAR 52.222-26, Equal Opportunity, shall apply.

XI. PATENT RIGHTS

A. For any NASA contract resulting from this solicitation awarded to other than a small business firm or nonprofit organization, the clause at NFS 18-52.227-70, New Technology, shall apply. Such contractors may, in advance of a contract, request waiver of rights as set forth in the provision at NFS 18-52.227-71, Requests for Waiver of Rights to Inventions.

B. For any NASA contract resulting from this solicitation awarded to a small business firm or nonprofit organization, the clause at FAR 52.227-11, Patent Rights--Retention by the Contractor (Short Form), (as modified by NFS 18-52.227-11) shall apply.

XII. RIGHTS IN DATA

Any contract resulting from this solicitation will contain the Rights in Data - General clause: FAR 52.227-14.

XIII. SMALL AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING

A. Offerors are advised that, in keeping with Congressionally mandated goals, NASA seeks to place a fair portion of its contract dollars, where feasible, with small disadvantaged business concerns, women-owned small business concerns, Historically Black Colleges and Universities, and minority educational institutions, as these entities are defined in 52.219-8 and in 52.226-2 of the FAR. For this Announcement of Opportunity, NASA has established a recommended goal of 8 percent for the participation of these entities at the prime and subcontract level. This goal is stated as a percentage of the total contract value. NASA encourages all offerors to meet or exceed this goal to the maximum extent practicable and to encourage the development of minority businesses and institutions throughout the contract period. Offerors will be evaluated on the proposed goal for participation of the entities listed above in comparison with the 8 percent goal and on the methods for achieving the proposed goal.

B. Offerors are advised that for NASA contracts resulting from this solicitation which offer subcontracting possibilities, exceed $500,000, and are with organizations other than small business concerns, the clause FAR 52.219-9 shall apply. Offerors who are selected under this AO will be required to negotiate subcontracting plans which include subcontracting goals for small, small disadvantaged, and women-owned small business concerns. Note that these specific subcontracting goals differ from the 8 percent goal described in paragraph A above, and need not be submitted with the proposal. Failure to submit and negotiate a subcontracting plan after selection shall make the offeror ineligible for award of a contract.

APPENDIX B

GUIDELINES FOR PROPOSAL PREPARATION

The following guidelines apply to the preparation of proposals by potential investigators in response to this Discovery missions AO and Missions of Opportunity. The material presented is merely a guide for the prospective proposer and is not intended to be all encompassing. The proposer should, however, provide information relative to those items that are applicable, as well as other items required by the AO. In the event of an apparent conflict between the guidelines in this Appendix and those contained within the body of the AO, those within the AO shall take precedence.

PROPOSAL PREPARATION GENERAL GUIDELINES

All documents must be typewritten in English, use the International System (SI) of units, and be clearly legible. Except for the required Cover Page and Proposal Summary to be submitted electronically, submission of proposal material by facsimile (fax), electronic media, videotape, floppy disk, etc., is not acceptable. In evaluating proposals, NASA will consider only printed material. No proposal may reference a World Wide Web site for any data or material related to the proposal.

The proposal must consist of only one volume, with readily identified sections for the scientific investigation; cost; technical approach; management plan; Phase A/B study plan; and education, outreach, technology, and small/disadvantaged business utilizaton**.** Note the page limits for the various sections, specified in the table below.

In order to allow for recycling of proposals after the review process, all proposals and copies must be submitted on plain white paper only (e.g., no cardboard stock or plastic covers, no colored paper, etc.). Photographs and color figures are permitted if printed on recyclable white paper only. Spiral binding is not acceptable. The original signed copy (including cover page, certifications, and nondomestic endorsements) should be bound in a manner that makes it easy to disassemble for reproduction. Except for the original, two-sided copies are preferred. Every side upon which printing appears will be counted against the page limits.

Proposals shall contain no more than 50 pages, including no more than five foldout pages (28 x 43 cm; i.e., 11 x 17 inches). All pages other than foldout pages shall be 8.5 x 11 inches. The following page limits apply to the proposals:

Section	Page Limit
Fact Sheets	2 pages
Science Investigation description	25 pages
Education, Outreach, Technology, and Small Disadvantaged Business Plan	3 pages
Mission Implementation, Management Plan, Phase A/B Study Plan, and Cost	20 pages
Appendices: (No others permitted) Resumes Letter(s) of Endorsement Statement(s) of Work (SOW) for each contract Incentive Plans Reference List (optional) Acronyms List (optional)	No page limit, but small size encouraged

Single- or double-column format is acceptable. In complying with the page limit, no page should contain more than 55 lines of text and the type font should not be smaller than 12-point Times (i.e., approximately 15 characters per inch). Figure captions should be in 12 point. Smaller font is allowed within figures and in the cost table. The cover page, table of contents, and required appendices will not be counted against the 50 page limit. Science team resumes, letters of endorsement, SOW's, Incentive Plans, and Reference List (optional) should be included as appendices, which are not counted against the 50 page limit.

The content of each section of the proposal for Discovery Missions is described below. For Missions of Opportunity provide the same information as is applicable to the proposed investigation. Since Missions of Opportunity represent **participation** in a non-NASA space mission and not a **complete mission**, some of the following content may not apply.

A. INVESTIGATION SUMMARY

A summary of the proposed investigation must be included with the proposal. The Investigation Summary does not count against the page limit. The form to be used for this Summary is located at the end of this Appendix. It is NASA's intent to enter the Summaries of all selected investigations for its various programs into a publically accessible data base. Therefore, the Investigation Summary should not contain any proprietary or confidential information that the submitter wishes to protect from public disclosure.

B. COVER PAGE

A cover page must be a part of the proposal, but will not be counted against the page limit. It must be signed by the Principal Investigator and an official by title of the investigator's organization who is authorized to commit the organization. The full names

of the Principal Investigator and the authorizing official, their addresses with zip code, telephone and fax numbers, and electronic mail addresses, shall be included.

C. FACT SHEET

A Fact Sheet that provides a brief summary of the proposed investigation must be included in the proposal. The information conveyed on this fact sheet should include the following: science objectives (including the importance of the science to planetary systems exploration), mission overview (including mission objectives and major mission characteristics), science payload, key spacecraft characteristics, anticipated launch vehicle, mission management (including teaming arrangement as known), schedule, and cost estimate. Other relevant information, including figures or drawings, may be included at the proposers' discretion. The fact sheet is restricted to two pages (preferably a double-sided single sheet).

D. TABLE OF CONTENTS

The proposal shall contain a table of contents, which will not be counted against the page limit. This table of contents should parallel the outlines provided below in Sections E through K.

E. SCIENCE

The science section should describe the scientific objectives of the proposed investigation, including the value of the investigation to solar system exploration and planetary science. It should provide a discussion of the scientific products and how the science products and data obtained will be used to fulfill the scientific objectives. A discussion of how the science data will be obtained, including a plan for delivery of the products, and the individuals responsible for the data delivery, should be provided.

1. Scientific Goals and Objectives. This section should consist of a discussion of the goals and objectives of the investigation, their value to solar system exploration and planetary science in general, and their relationships to past, current, and future investigations and missions. It should describe the history and basis for the proposal and discuss the need for such an investigation. An overview of the mission, identifying the target, the mission type (Earth-orbital, flyby, rendezvous, lander, sample return, etc.), basic encounter geometry, and prime mission lifetime should be provided.

   The measurements to be taken in the course of the mission, the data to be returned, and the approach that will be taken in analyzing the data to achieve the scientific objectives of the investigation should be discussed. This description should identify the experiments to be performed (imaging, spectroscopy, chemical analysis, sample return, etc.), the quality of the data to be returned (resolution, coverage, pointing accuracy, measurement precision, etc.), and the quantity of data to be returned (bits,

images, sample mass, volume, etc.). The relationship between the data products generated and the scientific objectives should be explicitly described, as should the expected results. It is assumed that the above information will constitute the Baseline Mission.

This section must also identify a minimum acceptable data and scientific return for the mission (the Performance Floor), below which the mission would not be worth pursuing. The value of the science in advancing solar system exploration and planetary science at the Performance Floor should be discussed. A description of the descope options available to the team, their phasing, and their effect on meeting the scientific objectives of the mission, as the mission is descoped from the Baseline to the Performance Floor, should be discussed. Proposals should include only one Baseline mission and one Performance Floor. NASA will not consider more than one Baseline mission per proposal.

2. Science Implementation.

   a. Instrumentation. This section should fully describe the instrumentation and the criteria used for its selection. It should identify the individual instruments and instrument systems, including their characteristics and requirements. It should indicate items that are proposed to be developed, as well as any existing instrumentation or design/flight heritage.

      A preliminary description of each instrument design with a block diagram showing the instrument systems and their interfaces should be included, along with a description of the estimated performance of the instrument. Performance characteristics should be related to the measurement and investigation objectives as stated in the proposal. Such characteristics include a discussion of the data rates, fields of view, resolution, precision/sensitivity, pointing accuracy, etc.

   b. Data Analysis and Archiving. The data reduction and analysis plan, after the data have been delivered to the ground, should be discussed, including the method and format of the data reduction, data validation, and preliminary analysis. The process by which data will be prepared for archiving should be discussed, including a list of the specific data products and the individual team members responsible for the data products. The plan must include a detailed schedule for the submission of raw and reduced data to the Planetary Data System (PDS) in the proper formats, media, etc. Delivery of the data to the PDS must take place in the shortest time possible.

   c. Science Team. This section should identify the mission science team, and the activities of that team should be described in detail. The capabilities and experience of all members of the proposed science team should be described. In addition, the role of each science team member in the investigation should be explicitly defined. If a Guest Investigator program is to be proposed, the

activities of those investigators should be discussed here. Resumes or curriculum vitae of team members may be included as attachments to the proposal.

F. EDUCATION, OUTREACH, TECHNOLOGY (INFUSION/TRANSFER), AND SMALL DISADVANTAGED BUSINESS PLAN

The education, outreach, technology (infusion/transfer), and small disadvantaged business section shall provide a summary of the benefits offered by the mission beyond the scientific benefits. This plan should reflect the proposer's commitment to achieving the goals of the OSS education and outreach strategy as reflected in the Implemention Plan for that strategy, participation of small disadvantaged business, and the use of new technology in the implementation of the investigations, as well as development of partnerships among space, nonspace firms, educational, other nonprofit organizations, and government entities to facilitate technology development and transfer. Further information on the OSS's broad approach to education and outreach can be found in *Implementing the Office of Space Science (OSS) Education and Outreach Strategy*, in the DPL. Appendix A Section XIII discusses requirements for SDB. Guidance on the infusion and transfer of new technology in investigations can be found in the *OSS Integrated Technology Strategy* in the DPL.

G. MISSION IMPLEMENTATION

This section should provide an overview of the mission, including mission design, instrument design, instrument accommodation, spacecraft, launch vehicle required, ground systems, and communication approach. It is recognized that teaming arrangements to implement the mission may not be complete at the time of the proposal. Proposers will not be penalized for this if the proposer demonstrates that there are candidate implementation approaches for the spacecraft, launch vehicle, communications, and ground systems that will allow the successful implementation of the investigation. This section should also contain an overview of the method and procedures for investigation definition, design, development, integration, ground operations, and flight operations.

H. MANAGEMENT PLAN

This section should summarize the investigator's proposed management approach. The management organization and decision-making process should be described and the teaming arrangement (as known) should be discussed. The responsibilities of team members and institutional commitments should be discussed. The specific roles and responsibilities of the Principal Investigator and Project Manager should be discussed. Unique capabilities that each team member organization brings to the team, as well as previous experience with similar systems and equipment, should be addressed. However, key project personnel (e.g. the Project Manger) need not be identified by name at this time. Potential risk areas and plans for mitigating those risks should be discussed. Investigation that depend on new technology will not be penalized for risk if adequate backup plans are described to ensure success of the investigation. A project schedule

covering all phases of the mission should be provided. The use of innovative processes, techniques, and activities by mission teams in accomplishing their objectives is encouraged when cost, schedule, or technical improvements can be demonstrated.

I. PHASE A/B STUDY PLAN

An overview of the Phase A/B study plans should be provided. This section should address how the technical, mission, science, and cost tradeoffs will be conducted, the primary products expected, and the interaction and coordination of various team members.

J. COST

This section shall include a first order estimated cost of the investigation that encompasses all proposed activities (concept study, Phase A/B, Phase C/D, Phase E, launch vehicle, fee, and contributions). These costs shall be consistent with the program requirements described in Section 3.1.1 and 3.5 and the funding profile in Appendix I. The methodology used to estimate the cost, such as specific cost model, past performance, cost estimating relationships from analogous missions, etc., should be outlined. The circumstances that would lead to maximum cost should be addressed and this disussion should include design uncertainties, descoping redefinition, unknown technology development cost, and descoping from Baseline mission to Performance Floor. Identify the cost that will be spent in each fiscal year by providing the data in Table B1. Proposers may refer to the information provided in Discover Program Library (See Appendix E) for mission operations and communications costs if NASA systems are proposed. A SF 1411 for the cost of the concept study is not required.

K. APPENDICES

The following additional information is required to be supplied with the proposal. This information can be included as Appendices to the proposal, and, as such, will not be counted within the specified page limit. NO OTHER APPENDICES ARE PERMITTED.

1. Resumes. Provide resumes or curriculum vitae for all science team members identified in the science section. Resumes or curriculum vitae should be no longer than two pages in length.

2. Letters of Endorsement. Letters of endorsement must be provided from all organizations participating in the investigation. Letters of endorsement should be signed by both the lead representative from each organization represented on the team, and by institutional and/or Government officials authorized to commit their organizations to participation in the proposed investigation.

3. Statement of Work (SOW): Provide a SOW for all potential contracts with NASA. This SOW must include all tasks for the concept studies and deliverables from these studies (See Appendix G). In addition, the SOW must include general tasks statements for Phases A/B/C/D/E for the investigation. All SOW's should include the following as a minimum: Scope of Work, Deliverables (including science data), and Government Responsibilities (as applicable).

4. Incentive Plans: Provide a brief discussion of proposed incentives that NASA would include in the contract to reward specific investigation achievements in reducing costs, meeting schedules, developing new technology, transferring technology to space, nonspace firms, educational, other nonprofit organizations, and government entities, etc.

The following information may be provided.

1. References List. Proposals may provide, as an appendix, a list of reference documents and materials used in the proposal. The documents and materials themselves cannot be submitted, except as a part of the proposal.

2. Acronyms List.

FIGURE B1

TOTAL MISSION COST FUNDING PROFILE TEMPLATE
(FY costs* in Real Year Dollars, Totals in Real Year Dollars)

Item	FY1	FY2	FY3	FY4	FY5	FY6	...	FYn	Total (Real Yr.)
Phase A/B	$	$	$	$	$	$	$	$	$
- Organization A									
- Organization B									
- etc.									
Phase C/D	$	$	$	$	$	$	$	$	$
- Organization A									
Phase E	$	$	$	$	$	$	$	$	$
- Organization A									
ELV and services	$	$	$	$	$	$	$	$	$
- Organization A									
DSN and Other Tracking Support	$	$	$	$	$	$	$	$	$
- Organization A									
Other (specify)	$	$	$	$	$	$	$	$	$
Total Cost to NASA	$	$	$	$	$	$	$	$	$
Additional Contributions by Organization (Foreign or Domestic) to:									
Total Phase A/B	$	$	$	$	$	$	$	$	$
- Organization A									
Total Phase C/D	$	$	$	$	$	$	$	$	$
- Organization A									
Total Phase E	$	$	$	$	$	$	$	$	$
- Organization A									
ELV Costs	$	$	$	$	$	$	$	$	$
- Organization A									
Tracking Support	$	$	$	$	$	$	$	$	$
- Organization A									
Other	$	$	$	$	$	$	$	$	$
Contributed Costs (Total)	$	$	$	$	$	$	$	$	$
						Mission Totals			$

* Costs should include all costs including fee

APPENDIX C

EDUCATION/PUBLIC OUTREACH EVALUATION CRITERIA AND PROPOSAL PREPARATION ASSISTANCE

Education and Public Outreach Plan Evaluation Criteria

The specific evaluation criteria against which a proposed E/PO activity will be judged are:

- The quality, scope, and realism of the proposed E/PO program;
- The establishment of effective, long-duration partnerships with institutions and/or personnel in the fields of educational and/or public outreach as the basis for and an integral element of the proposed E/PO program;
- The prospects for the proposed E/PO program to have a "multiplier effect" reaching audiences well beyond those directly targeted by the proposed activity (e.g., prospects for the broad dissemination of a planned E/PO product);
- For proposals dealing with a formal education program, the degree to which the proposed E/PO program benefits and promotes nationally recognized and endorsed efforts in education reform and ongoing reform efforts being carried out at the state, district, or local levels;
- The adequacy of plans for evaluating the effectiveness and impact of the proposed education/outreach activity;
- The degree to which the proposed E/PO effort contributes to the training of, involvement in, and broad understanding of science and technology by underserved/underutilized groups;
- The prospects for building on, taking advantage of, and leveraging existing and/or ancillary resources beyond those directly requested in the proposal;
- The capability and commitment of the proposer to carry out the proposed E/PO program; and
- The adequacy and realism of the proposed budget (including any additional resources outside those requested from NASA).

Note that originality of the proposed effort is not a criterion. Rather, NASA OSS seeks assurance that the PI is committed to carrying out a meaningful, effective, credible, and appropriate E/PO activity; that such an activity has been planned and will be executed; and that the proposed investment of resources will make a significant contribution toward meeting OSS education/outreach goals and objectives. Additional guidance is contained in the OSS E/PO strategy and implementation plans referenced in section 3.3.1.

The E/PO component of proposals will be evaluated by appropriate scientific and professional education and outreach personnel and the results of that evaluation will be factored into the overall evaluation of the proposal and the selection process as outlined in Section 7.

Education and Public Outreach Proposal Assistance

To directly aid OSS research personnel to identify suitable education and/or outreach opportunities and to help develop partnerships between the space science and education/outreach communities, in mid 1997 NASA OSS initiated an "Education and Outreach Broker/Facilitator Program." The goal of this Broker/Facilitator program is to search out and establish high leverage opportunities, arrange alliances between educators and OSS-supported scientists, help scientists turn results from space science missions and programs into educationally appropriate products and/or services, and/or arrange for the results from such education and outreach activities to be disseminated regionally and/or nationally. Further information about this program, a list of the selected OSS Broker/Facilitators, and information on the services to be provided to the space science community by the Broker/Facilitators may be accessed through "Education and Outreach" from the OSS homepage at URL:

http://www.hq.nasa.gov/office/oss/

Note that the 4 theme-oriented Education Forums listed on the OSS homepage also serve as Broker/Facilitators and these groups may also be consulted for assistance. Proposers to this AO are strongly encouraged to make use of the Broker/Facilitator of their choice to aid in development of their E/PO proposal.

APPENDIX D

REGULATIONS GOVERNING PROCUREMENT OF FOREIGN GOODS OR SERVICES

The following Federal Acquisition Regulation (FAR) clauses cover the purchase of foreign goods and services and may be included in contracts resulting from this Announcement of Opportunity:

52.225-3 Buy American Act -- Supplies (January 1994)

52.225-7 Balance of Payments Program (April 1984)

52.225-9 Buy American Act -- Trade Agreements -- Balance of Payments Program (January 1994)

52.225-10 Duty-Free Entry (April 1984)

52.225-11 Restrictions on Certain Foreign Purchases (May 1992)

52.225-17 Buy American Act -- Supplies Under European Community Agreement (May 1995)

52.225-18 European Community Sanction for End Products (May 1995)

52.225-19 European Community Sanction for Services (May 1995)

52.225-21 Buy American Act -- North American Free Trade Agreement Implementation Act Balance of Payments Program (January 1994)

The proposer is directed to the Federal Acquisition Regulation and the NASA FAR Supplement for further information on these regulations.

APPENDIX E

CONTENTS OF THE DISCOVERY PROGRAM LIBRARY

The Discovery Program Library includes documents available electronically via the Internet, as well as paper copy. Proposers are requested to access the document electronically where possible. Only limited paper copies of some documents are available, therefore requests for copies must be approved by NASA Hq. Please note that not all documents are available via the Discovery Program Library, but access information is provided.

It is incumbent upon the proposer to ensure that the documents used in proposal preparation are of the date and revision listed in the Announcement of Opportunity or this Appendix.

The Discovery Program Library is accessible on the World Wide Web at the URL address:

http://discovery.larc.nasa.gov/discovery/dpl.html

Requests for paper copies must be submitted in writing to either of the below addresses:

Mr. George Albright
Mission and Payload Development Division
Code SD
Ref. Discovery 98
National Aeronautics and Space Administration
Washington, DC 20546

Fax Number: 202-358-3987
E-mail: ossao@hq.nasa.gov
note: E-mail subject field must include the character string "DISCAO"
Phone: (202) 358-0356

Dr. Jay Bergstralh
Discovery Program Scientist
Code SR
Ref. Discovery 98
National Aeronautics and Space Administration
Washington, DC 20546

Fax Number: 202-358-3097
E-mail: jay.bergstralh@hq.nasa.gov
Phone: (202) 358-0313

Office of Space Science Strategies and Policies

The Space Science Enterprise Strategic Plan: Origins, Evolution, and Destiny of the Cosmos and Life **(**November 1997)

This document is a concise statement of the goals and outlook of NASA's Space Science Enterprise. It is a compilation of the major ideas described in more detail in the context of the overall NASA Strategic Plan.

Partners in Education: A Strategy for Integrating Education and Public Outreach into NASA's Space Science Programs (March 1995)

This document describes the overall strategy for integrating education and public outreach into NASA's space science programs.

Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy (October 1996)

This document describes OSS's overall approach to implementing its Education/Public Outreach strategy.

OSS Integrated Technology Strategy (April 1994)

Describes efforts to manage technology infusion into future OSS missions and to promote technology transfer to the private sector.

Space Science Roadmaps

The science themes of the NASA Office of Space Science, through the Space Science Advisory Committee and its subcommittees, have developed Roadmaps. These planning documents prioritize the space science goals for NASA for the years 2000-2020. The following Roadmaps apply to the Discovery program:

Mission to the Solar System: Exploration and Discovery, A Mission and Technology Roadmap, 2000-2025 (September 1996)

Search for Origins Roadmap (April 1997)
A paper copy may be obtained by sending an E-mail with name and address to <hthronson@hq.nasa.gov>.

Space Science Supporting Documents

HST and Beyond. Exploration and Search for Origins: A Vision for Ultraviolet - Optical - Infrared Space Astronomy (May 1996)

Report of the "HST and Beyond Committee."

Exploration of Neighboring Planetary Systems (ExNPS) Study (August 1996)

Jet Propulsion Laboratory report. Mission and technology road map; presentation to the Townes Blue Ribbon Panel.

SSES: Solar System Exploration 1995-2000 (September 1994).

NRC Planetary and Lunar Exploration Committee: ***An Integrated Strategy for the Planetary Sciences: 1995-2010*** (May 15, 1996)

Discovery Guidelines and Requirements Documents

Mission Operations and Communications Services Information Summary.

Describes the functions and costs of Ground Data Systems and Mission Operations and Data Analysis available via NASA.

Discovery Launch Services Information Summary

Provides information on capabilities and costs of launch services that are available to launch Discovery spacecraft selected pursuit to this AO.

General Guideline and Requirements Documents

Example of International Agreement

Example of an Agency to Agency agreement for International cooperation.

Example Mission Definition and Requirements Agreement

Example of such an agreement.

NHB 7120.5 -- Management of Major System Programs and Projects (November 1993)

This NASA Handbook provides a reference for typical activities, milestones, and products in the development and execution of NASA missions.

ISO 9000 Series

The following ISO 9000 quality documents describe current national and NASA standards of quality processes and procedures. American National Standard, "Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing," ANSI/ASQC Q9001-1994.

"Quality Management and Quality System Elements - Guidelines," ANSI/ASQC Q9004-1-1994.

"Quality Management and Quality Assurance Standards - Guidelines for Selection and Use," ANSI/ASQC Q9000-1-1994

"ISO 9000 and NASA," Code Q presentation, April 24, 1995.

Note: The first three ISO 9000-related documents are copyrighted and cannot be reproduced without appropriate compensation. For copies contact:

American Society for Quality Control (ASQC)
P.O. Box 3066
Milwaukee, WI 53201-3066
800-248-1946

Planetary Data System Data Preparation Workbook (February 1995*).*

This document describes the basic formats and requirements used for the archiving of planetary data products by the Planetary Data System (PDS).

Planetary Protection Requirements.

Includes information on Planetary Protection Requirements for NASA spacecraft missions.

NASA Technology Transfer Resources.

The NASA Commercial Technology Network (CTN) serves as an integrated information resource for NASA technology transfer and commercialization.

Discovery Program Background

Discovery Management Workshop Reports.

Includes "*Final Report of the Discovery Management Workshop"* and *Recommendations for Discovery Policy and Implementation Guidelines,* two documents generated by the Aporil 1993 Discovery Mangement Workshop which was convened to address issues in the management of individual Discovery missions and of the Discovery Program as a whole.

Workshop on Discovery Lessons-Learned.

This report provides a summary of the lessons learned from the first Discovery AO as a result of the Discovery Program Lessons-Learned Workshop.

Directives and Procurement-related Information

Electronic versions only are available for the following:

NASA Online Directives Information System (NODIS) II.

The NODIS II Directives Library provides online access to the NASA Policy Directives (NPD's - formerly NMI's), NASA Procedures and Guidelines (NPG's - formerly NHB's) and NASA's Policy Charters (NPC's).

Federal Acquisition Regulations (FAR) General Services Administration
(URL: http://www.arnet.gov/far/)

NASA FAR Supplement Regulations
(URL: http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm)

NASA Financial Management Manual
(URL: http://www.hq.nasa.gov/fmm/

NPG 5800.1D -- Grant and Cooperative Agreement Handbook (July 1996)
(URL: http://nais.msfc.nasa.gov/msfc/grcover.htm)

APPENDIX F

CERTIFICATIONS

CERTIFICATION REGARDING DRUG-FREE WORKPLACE REQUIREMENTS

This certification is required by the regulations implementing the Drug-Free Workplace Act of 1988, 14 CFR Part 1265. The regulations, require certification by grantees, prior to award, that they will maintain a drug-free workplace. The certification set out below is a material representation of fact upon which reliance will be placed when the agency determines to award the grant. False certification or violation of the certification shall be grounds for suspension of payments, suspension or termination of grants, or government-wide suspension or debarment.

I. GRANTEES OTHER THAN INDIVIDUALS

A. The grantee certifies that it will provide a drug-free workplace by:

(a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(b) Establishing a drug-free awareness program to inform employees about --

(1) The dangers of drug abuse in the workplace;

(2) The grantees policy of maintaining a drug-free workplace;

(3) Any available drug counseling, rehabilitation, and employee assistance programs; and

(4) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);

(d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will

(1) Abide by the terms of the statement; and

(2) Notify the employer of any criminal drug statute conviction for a violation occurring in the workplace no later than five days after such conviction;

(e) Notifying the agency within ten days after receiving notice under subparagraph (d) (2) from an employee or otherwise receiving actual notice of such conviction;

(f) Taking one of the following actions, within 30 days of receiving notice under subparagraph (d) (2), with respect to any employee who is so convicted --

(1) Taking appropriate personnel action against such an employee, up to and including termination; or

(2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or Local health, Law enforcement, or other appropriate agency;

(g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a), (b), (c), (d), (e), and (f)

B. The grantee shall insert in the space provided below the site(s) for the performance or work done in connection with the specific grant:

Place of Performance (Street address, city, county, state, zip code)

_____

_____

_____

_____

Check _____ if there are workplaces on file that are not identified here.

II. GRANTEES WHO ARE INDIVIDUALS

The grantee certifies that, as a condition of the grant, he or she will not engage in the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance in conducting any activity with the grant.

Organization Name | AO or NRA Number and Title

Printed Name and Title of Authorized Representative

Signature | Date

Printed Principal Investigator Name | Proposal Title

CERTIFICATION REGARDING
DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS
PRIMARY COVERED TRANSACTIONS

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 14 CFR Part 1265. The regulations were published as Part VII of the May 28, 1988 Federal Register (pages 19160–19211). Copies of the regulations may be obtained by contacting the U.S. Department of Education, Grants and Contracts Service, 400 Maryland Avenue, S.W. (Room 3633 GSA Regional Office Building No. 3), Washington, D.C. 20202-4725, telephone (202) 732-2505.

A. The applicant certifies that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(b) Have not within a three-year period preceding this application been convicted or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or Local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or Local) with commission of any of the offenses enumerated in paragraph A.(b) of this certification;

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or Local) terminated for cause or default; and

B. Where the applicant is unable to certify to any of the statements in this certification, he or she shall attach an explanation to this application.

C. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lowered Tier Covered Transactions (Subgrants or Subcontracts)

(a) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principles is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department of agency.

(b) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Organization Name | AO or NRA Number and Title

Printed Name and Title of Authorized Representative

Signature | Date

Printed Principal Investigator Name | Proposal Title

CERTIFICATION REGARDING
LOBBYING

As required by S 1352 Title 31 of the U.S. Code for persons entering into a grant or cooperative agreement over $100,000, the applicant certifies that:

(a) No Federal appropriated funds have been paid or will be paid by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, in connection with making of any Federal grant, the entering into of any cooperative, and the extension, continuation, renewal, amendment, or modification of any Federal grant or cooperative agreement;

(b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting an officer or employee of any agency, Member of Congress, or an employee of a Member of Congress in connection with this Federal grant or cooperative agreement, the undersigned shall complete Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(c) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subgrants, contracts under grants and cooperative agreements, and subcontracts), and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by S1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Organization Name | AO or NRA Number and Title

Printed Name and Title of Authorized Representative

Signature | Date

Printed Principal Investigator Name | Proposal Title

APPENDIX G

GUIDELINES FOR CONCEPT STUDY REPORT PREPARATION

Multiple proposals from this solicitation will be selected and awarded contracts to conduct concept studies to better define the investigations, their implementation requirements, and risks. Selected proposers will be given any revisions or updates to these guidelines at notification of selection and before initiation of the concept studies. Upon completion of the investigation concept study, proposers will be requested to submit study results for NASA evaluation. The intent of this appendix is to provide guidelines for the preparation of the Concept Study Report.

The required uniform Concept Study Report format and contents are summarized below. Failure to follow this outline may result in reduced ratings during the evaluation process and could lead to the investigation not being confirmed for development or flight.

The Concept Study Report shall contain the following: the investigation fact sheet; the science discussion; education, outreach, technology, and small disadvantaged business plan; technical approach; management plan; Phase A/B study plan; cost plan; and Appendices. When changes have been made to any data provided with the original proposal as a result of the concept study, these changes should be clearly identified. The content of each requirement is discussed in the subsequent paragraphs.

The Report shall contain no more than 132 pages, including no more than seven foldout pages (28 x 43 cm; i.e., 11 x 17 inches). The cover page, table of contents, and reference list will not be counted against the 132-page limit of the volume. The following page limits apply:

Section	Page Limit
Executive Summary (including Fact Sheet)	7 pages
Science Investigation description (changes highlighted)	25 pages
Education, Outreach, Technology, and Small Disadvantaged Business Plan Technical Approach Management Plan Phase A/B Study Plan Cost Plan	100 pages
Appendices (No other appendices permitted) Resumes Letters of Endorsement Mission Definition and Requirements Agreement Statement(s) of Work for Each Contract Option Incentive Plan(s) Relevant Experience and Past Performance International Agreement(s) Reference List (Optional) Acronyms List(Optional)	No page limit, but small size encouraged

A. FACT SHEET

The same guidelines from the proposal apply. A new Fact Sheet should only be submitted if the information provided with the proposal has changed.

B. COVER PAGE

The same guidelines from the proposal apply.

C. TABLE OF CONTENTS

The same guidelines from the proposal apply.

D. EXECUTIVE SUMMARY

The executive summary should provide an overview of the investigation, including its scientific objectives; technical approach; management plan; cost estimate; and educational, technological, and public outreach plans. This introduction and summary should be no longer than seven (7) pages.

E. SCIENCE INVESTIGATION DESCRIPTION

This section should redescribe the science investigation resulting from the Concept Study. Any descoping of, or changes to, the investigation from the baseline mission defined in the proposal, including the rationale for the changes, should be discussed and highlighted in bold or column marking for easy identification.

F. EDUCATION, OUTREACH, TECHNOLOGY, AND SMALL DISADVANTAGED BUSINESS PLAN

The education, outreach, technology, and small disadvantaged business plan should provide a summary of the benefits offered by the mission beyond the scientific benefits brought by obtaining and analyzing the desired scientific data, including educational program activities, public awareness, and other benefits.

1. Educational Program Activities. This section should discuss the degree to which this investigation will generate educational opportunities and contribute to the Nation's educational initiatives. The breadth of involvement of the educational program, including educators, researchers, amateur organizations, and the public at large should be discussed, as should educational activities to be implemented. Coordination and collaboration with educational institutions should be discussed, along with a discussion of how the mission team will implement the educational program. A summary of the proposed budget targeted to educational activities, including any potential leveraging of other resources, and a timeline for the execution of the education program, should be provided.

2. Public Awareness. This section should describe the degree to which the scientific investigation and discoveries will be communicated to the public. The public awareness plan should address how the progress of and results from the mission will be disseminated to the public; the interaction of the various team members; and a schedule of the public awareness activities with mission progression.

3. Small Disadvantaged Business. A summary plan is required specifying the proposed investigation's commitment to meet the SDB participation goal of 8% as described in Section XIII of Appendix A of this AO. In addition, as also specified in Appendix A, subcontracting plans will be required to execute the contract option for investigation implementation.

4. New Technology. This section should discuss how new technology is used in the proposed investigation. The functions that the new technology performs and how it will be demonstrated for the investigation should be described. Also to be discussed is the development of partnerships among space, nonspace firms, educational, other nonprofit organizations, and government entities to facilitate technology development and transfer, along with how the mission team will implement the transfer.

G. TECHNICAL APPROACH

The Technical Approach section should detail the method and procedures for investigation definition, design, development, integration, ground operations, and flight operations. A discussion of all new technologies to be used for the investigation, including back-up plans for those technologies, should be provided. This section should also detail the expected products and end items associated with each phase. Mission teams have the freedom to use their own processes, procedures, and methods. The use of innovative processes, techniques, and activities by mission teams in accomplishing their objectives is encouraged when cost, schedule, and technical improvements can be demonstrated. The benefits of such processes and products should be discussed. This section must be complete in itself without the need to request additional data.

1. Mission Design. This section should fully describe the operational phase of the mission from launch to end of mission. It should include information on the proposed launch vehicle, trajectories, Delta-V requirements, encounter geometry (orbiter, flyby, lander, etc.) and characteristics (flyby speed, orbital period, etc.), and a preliminary mission timeline indicating periods of data acquisition, data downlink, etc. The mission design should also describe Deep Space Network (DSN) or other communications network to be used, and interface requirements, along with potential impacts or conflicts with other users of the selected communications resources.

   A "traceability matrix" showing how the proposed mission design complies with the stated objectives, requirements, and constraints of the proposed investigation should be included. The rationale for the selection of launch vehicle should be included. The proposal should identify any innovative features of the mission design that minimize total mission costs.

2. Spacecraft. This section should describe the spacecraft design approach, particularly as it relates to new versus existing hardware and redundant versus single-string hardware. It should fully identify the spacecraft systems and describe their characteristics and requirements. A preliminary description of the flight system design with a block diagram showing the flight element subsystems and their interfaces should be included, along with a description of the flight software and a summary of the estimated performance of the flight system. The flight heritage or rationale used to select the flight system and its subsystems, major assemblies, and interfaces should be described.

   Subsystem characteristics and requirements should be described to the greatest extent possible. Such characteristics include: mass, volume, and power requirements; pointing knowledge and accuracy; new developments needed; space qualification plan; and logistics support. These subsystems may include: structural/mechanical, solar array/power supply (and batteries), electrical, thermal control, propulsion, communications, attitude control, command, and data handling, etc. Any design features incorporated to effect cost savings should be identified; however, benefits

should be specified and enabling assumptions or risks should be identified. A summary of the resource elements of the flight systems design concept, including key margins, should be provided. The rationale for, and derivation of, margin allocations including mass, power, link, etc., should be provided. Those design margins that are driving costs should be identified.

3. Science Payload. This section should briefly describe the science payload for the investigation. Reference may be made to the proposal. Any changes to the payload or individual instruments or their performance since submission of the proposal should be discussed. Information pertinent to the accommodation of the instrumentation on the spacecraft should also be included. Subsystem characteristics and requirements should be described. Such characteristics include: mass, volume, and power requirements; pointing requirements; new developments needed; and a space qualification plan. Any design features incorporated to effect cost savings should be identified. A summary of the resource elements of the instrument design concept, including key margins, should be provided. The rationale for margin allocation should be provided. Those design margins that are driving costs should be identified.

4. Payload Integration. This section should characterize the interface between the instruments and the flight system. These include, but are not limited to: volumetric envelope, fields of view, weight, power requirements, thermal requirements, command and telemetry requirements, sensitivity to or generation of contamination (e.g., electromagnetic interference, gaseous effluents, etc.), data processing requirements, as well as the planned process for physically and analytically integrating them with the flight system. The testing strategy of the science payload, prior to integration with the spacecraft, should be discussed.

5. Manufacturing, Integration, and Test. This section should describe the manufacturing strategy to produce and test the hardware/software necessary to accomplish the mission. It should include a description of the main processes/procedures planned in the fabrication of flight hardware, software, production personnel resources, incorporation of new technology/materials, and the preliminary test and verification program. Describe the approach for transitioning from design to manufacturing and specify data products which will be used to assure producibility and adequate tooling availability.

   The approach, techniques, and facilities planned for integration, test and verification, and launch operations phases, consistent with the proposed schedule and cost, should be described. A preliminary schedule for manufacturing, integration, and test activities should be included. A description of the planned end items, including engineering and qualification hardware, should be included.

6. Mission Operations, Ground, and Data Systems. This section should discuss mission operations and the ground operations support required for the proposed investigation.

The planned approach for managing mission operations and all flight operations support, including mission planning, should be discussed. Describe any special communications, computer security, tracking, or near real-time ground support requirements, and indicate any special equipment or skills required of ground personnel.

The approach to the development of the ground data system, including the use, if any, of existing facilities, including Government facilities, should be described. All usage of the Deep Space Network (DSN) and of any existing non-DSN facilities, including Tracking and Data Relay Satellite System (TDRSS), should be explicitly described. Any mission-unique facilities must be adequately described. Include a block diagram of the Ground Data System (GDS) showing the end-to-end concept (acquisition through archiving) for operations and data flow to the subsystem level. Describe all communications, tracking, and ground support requirements. Describe the software design heritage and software development approach and its relationship to the flight system software development.

Specific features incorporated into the flight and ground system design that lead to low-cost operation should be identified. The use of any existing mission operations facilities and processes should be described, as well as any new facilities required to meet mission objectives.

7. Facilities. Provide a description of any new, or modifications to existing, facilities, laboratory equipment, and ground support equipment (GSE) (including those of the team's proposed contractors and those of NASA and other U.S. Government agencies) required to execute the investigation. The outline of new facilities and equipment should also indicate the lead time involved and the planned schedule for construction, modification, and/or acquisition of the facilities.

8. Product Assurance and Safety. This section should describe the process by which the product quality is assured to meet the customer's specifications, including identification of trade studies, the parts selection strategy, and the plans to incorporate new technology. This section should also describe the product assurance plan, including plans for problem/failure reporting, inspections, quality control, parts selection and control, safety assurance, and software validation.

H. MANAGEMENT PLAN

This section sets forth the investigator's approach for managing the work, the recognition of essential management functions, and the overall integration of these functions. This section should specifically discuss the decision-making process to be used by the team, focusing particularly on the roles of the Principal Investigator and Project Manager in that process. The management plan gives insight into the organizations proposed for the work, including the internal operations and lines of authority with delegations, together with internal interfaces and relationships with NASA, major subcontractors, and

associated investigators. It also identifies the institutional commitment of all team members, and the institutional roles and responsibilities. The use of innovative processes, techniques, and activities by mission teams in accomplishing their objectives is encouraged; however, they should be employed only when cost, schedule, or technical improvements can be demonstrated and specific enabling assumptions are identified.

1. Team Member Responsibilities. This section should describe the roles, responsibilities, time commitment, and experience of all team member organizations and key personnel, with particular emphasis placed on the responsibilities assigned to the Principal Investigator, the Project Manager, and other key personnel. In addition, information should be provided which indicates what percentage of time key personnel will devote to the mission, the duration of service, and how changes in personnel will be accomplished. (Note: The experience of the PI and science team members does not need to be included in this section since it would have been addressed in the proposal.)

    a. Organizational Structure. The management organizational structure of the investigation team must be described in the proposal. The proposal must describe the responsibilities of each team member organization and its contributions to the investigation. Each key position, including its roles and responsibilities, how each key position fits into the organization, and the basic qualifications required for each position, must be described. A discussion of the unique or proprietary capabilities that each member organization brings to the team, along with a description of the availability of personnel at each partner organization to meet staffing needs, should be included. The contractual and financial relationships between team partners should be discussed.

    If experience for a partner is not equivalent to, or better than, the requirements for the proposed mission, explain how confidence can be gained that the mission can be accomplished within cost and schedule constraints.

    b. Experience and Commitment of Key Personnel. Provide a history of experience explaining the relationship of the previous experience to each key individual's role; include the complexity of the work and the results. Include changes in scope during development, if appropriate.

        i. Principal Investigator. The role(s), responsibilities, and time commitment of the Principal Investigator should be discussed. Provide a reference point of contact, including address and phone number.

        ii. Project Manager. The role, responsibilities, time commitment, and experience of the Project Manager should be discussed. Provide a reference point of contact, including address and phone number.

iii. Other Key Personnel. The roles, responsibilities, time commitments, and experience of other key personnel in the investigation should be described.

2. Management Processes and Plans. This section should describe the management processes and plans necessary for the logical and timely pursuit of the work, accompanied by a description of the work plan. This section should also describe the proposed methods of hardware and software acquisition. The management processes which the investigator team proposes, including the relationship between organizations and key personnel should be discussed, including the following, as applicable: systems engineering and integration; requirements development; configuration management; schedule management; team member coordination and communication; progress reporting, both internal and to NASA; performance measurement; and resource management. This discussion should include all phases of the mission including preliminary analysis, technical definition, the design and development, and operations phases, along with the expected products and results from each phase. Unique tools, processes, or methods which will be used by the investigation team should be clearly identified and their benefits discussed. All project elements should be covered to assure a clear understanding of project-wide implementation.

3. Schedules. The schedule and work flow for the complete mission life-cycle should be clearly defined, and the method and tools to be used for internal review, control, and direction discussed. Schedules for all major activities, interdependencies between major items, deliveries of end items, critical paths, schedule margins, and long-lead procurement needs (defined as hardware procurements required before the start of Phase C/D) should be clearly identified.

4. Risk Management. This section should describe the approach to, and plans for, risk management to be taken by the team, both in the overall mission design and in the individual systems and subsystems. Particular emphasis should be placed on describing how the various elements of risk, including new technologies used, will be managed to ensure successful accomplishment of the mission within cost and schedule constraints. Investigations dependent on new technology will not be penalized for risk if adequate backup plans are described to ensure success of the investigation.

   A summary of margins and reserves in cost and schedule should be identified by Phase and project element and year and the rationale for them discussed. The specific means by which integrated costs, schedule, and technical performance will be tracked and managed should be defined. Specific reserves and the timing of their application should be described. Management of the reserves and margins, including who in the management organization manages the reserves and when and how the reserves are released, should be discussed. This should include the strategy for maintaining reserves as a function of cost-to-completion. All funded schedule margins should be identified. The relationship between the use of such reserves, margins, potential

descope options, and their effect on cost, schedule, and performance should be fully discussed.

5. Government Furnished Property, Services, Facilities, etc. This section should clearly delineate the Government-furnished property, services, facilities, etc. required to accomplish all phases of the mission.

6. Reporting and Reviews. This section should clearly describe the approach to reporting progress to the Government and the reviews the Government is invited to attend to provide independent oversight. The process, including the individual or organization responsible for reporting integrated cost, schedule, and technical performance should be discussed. A description of the information to be presented should be included.

I. PHASE A/B STUDY PLAN

This section should describe the means by which the preliminary analysis/technical definition study phases (Phase A/B) will be performed. This section should identify the key mission tradeoffs and options to be investigated during the Phase A/B studies and should identify those issues and technologies critical to the mission success. These plans should also define the products of each phase and the schedule for their delivery.

J. COST PLAN

The cost plan should provide information on the anticipated costs for all phases of the mission. A detailed cost proposal is required, including a completed SF 1411, for the Phase A/B study. Cost estimates are required for the follow-on Phases (C/D and E), including a description of the estimating technique used to develop the cost estimates. A discussion of the basis of the estimate should be provided with a discussion of heritage and commonality with other programs. All costs, including all contributions made to the investigation, should be included. Proposers should complete a summary of total mission cost phased by fiscal year as shown in Figure G1. If obligation authority in excess of identified costs are required, the proposal must also indicate the authority needed by year. In addition, for each phase for the investigation (A/B, C/D, and E) a Time Phased Cost Breakdown for each Work Breakdown Structure (WBS) element, as shown in Figure G2, should be completed.

It is anticipated that during the period of performance of the proposed mission, NASA will implement full cost accounting for NASA Centers or other Government laboratories. To plan for this, proposers should include all contributions provided by NASA Centers, including Civil Servant services, as well as the cost for the use of Government facilities and equipment. All direct and indirect costs associated with the work performed at NASA Centers should be fully costed and accounted for in the proposal. Teams should work with their respective NASA Centers to develop estimates for these costs.

The inflation index provided in Appendix J should be used to calculate all real-year dollar amounts, unless an industry forward pricing rate is used. If something other than the provided inflation index is used, the rates used should be documented.

All costs shall include all burdens and profit/fee in real-year dollars by fiscal year, assuming the inflation rates used by NASA (provided in Appendix J) or specifically identified industry forward pricing rates.

1. Phase A/B Cost Proposal. This section provides a detailed cost proposal for performing the Phase A/B study. Detailed plans for the study should be described, but reference may be made to the Technical Approach and Management sections of the proposal, as appropriate.

    a. Contract Pricing Proposal Cover Sheet. A completed Contract Pricing Proposal Cover Sheet, SF 1411, must be included with the proposal for the Phase A/B study. The SF 1411 must be signed by the proposer's authorized representative.

    b. Work Breakdown Structure. A Work Breakdown Structure (WBS) should be included for the study phase (A/B) of the mission. The structure of the WBS should be consistent with the plans set forth in the Technical Approach and Management sections of the proposal and the Statement of Work provided as an Appendix to the proposal.

    c. Workforce Staffing Plan. Provide a workforce staffing plan which is consistent with the Work Breakdown Structure. This workforce staffing plan should include all team member organizations and should cover all management, technical (scientific and engineering), and support staff. The workforce staffing plan should be phased by month. Time commitments for the Principal Investigator, Project Manager, and other key personnel should be clearly shown.

    d. Proposal Pricing Technique. Describe the process and techniques used to develop the Phase A/B cost proposal. Provide a description of the cost-estimating model(s) and techniques used in the Phase A/B cost estimate. Discuss the heritage of the models and/or techniques applied to this estimate, including any known differences between missions contained in the model's data base and key attributes of the proposed mission. Include the assumptions used as the basis for the Phase A/B cost and identify those which are critical to cost sensitivity in the investigation. Identify any "discounts" assumed in the cost estimates for business practice initiatives or streamlined technical approaches. Describe how these have been incorporated in the cost estimate and will be managed by the investigation team.

    e. Phase A/B Time-Phased Cost Summary. Provide a summary of the total Phase A/B costs consistent with Figure G2. The Phase A/B cost summary should be developed consistent with the Work Breakdown Structure and should include all

costs to NASA along with all contributed costs. The Phase A/B time phased cost summary should be phased by month. Note: It is anticipated that Phases A and B will be on the order of no longer than 9 months each.

f. Cost Elements Breakdown. To effectively evaluate the Phase A/B cost proposals, NASA requires costs and supporting evidence stating the basis for the estimated costs. The proposal will include, but is not limited to:

i. Direct Labor.
   (1) Explain the basis of labor-hour estimates for each of the labor classifications.
   (2) State the number of productive work-hours per month.
   (3) Provide a schedule of the direct labor rates used in the proposal. Discuss the basis for developing the proposed direct labor rates for the team member organizations involved; the forward-pricing method (including midpoint, escalation factors, anticipated impact of future union contracts, etc.); and elements included in the rates, such as overtime, shift differential, incentives, allowances, etc.
   (4) If available, submit evidence of Government approval of direct labor rates for proposal purposes for each labor classification for the proposed performance period.
   (5) If Civil Servant labor is to be used in support of the Phase A/B study, but is not to be charged directly to the investigation, then this labor must be considered as a contribution by a domestic partner, subject to the same restrictions as other contributions by domestic or foreign partners. A discussion of the source of funding for the Civil Servant contributions must be provided.

ii. Direct Material. Submit a summary of material and parts costs for each element of the WBS.

iii. Subcontracts. Identify fully each effort (task, item, etc. by WBS element) to be subcontracted, and list the selected or potential subcontractors, locations, amount budgeted/proposed and types of contracts. Explain the adjustments, if any, and the indirect rates (or burdens) applied to the subcontractors' proposed amounts anticipated. Describe fully the cost analysis or price analysis and the negotiations conducted regarding the proposed subcontracts.

iv. Other Direct Costs.
   (1) Travel, Relocation, and Related Costs. Provide a summary of the travel and relocation costs including the number of trips, duration, and purpose of the trips.
   (2) Computer. Provide a summary of all unique computer-related costs.
   (3) Consultants. Indicate the specific task area or problem requiring consultant services. Identify the proposed consultants, and state the quoted daily rate, the estimated number of days and associated costs (such as travel), if any. State whether the consultant has been

compensated at the quoted rate for similar services performed in connection with Government contracts.

(4) Other. Explain and support any other direct costs included in the Phase A/B proposal in a manner similar to that described above.

v. Indirect Costs.

(1) List all indirect expense rates for the team member organizations. Indirect expense rates (in the context of this AO) include labor overhead, material overhead, general and administrative (G&A) expenses, and any other cost proposed as an allocation to the proposed direct costs.

(2) If the proposal includes support services for which off-site burden rates are used, provide a schedule of the off-site burden rates. Include a copy of the company policy regarding off-site vs. on-site effort.

(3) If available, submit evidence of Government approval of any/all projected indirect rates for the proposed period of performance. Indicate the status of rate negotiations with the cognizant Government agency, and provide a comparative listing of approved bidding rates and negotiated actual rates for the past five (5) fiscal years.

(4) Discuss the fee arrangements for the major team partners.

2. Design/Development (Phase C/D) Cost Estimate. This section provides a cost estimate for performing the Design/Development Phase (Phase C/D) portion of the mission. The Phase C/D cost estimates should correlate with the plans set forth in the Science, Technical Approach, and Management sections of the proposal. In completing this section, the following guidelines will apply:

a. Work Breakdown Structure. A Work Breakdown Structure (WBS) should be included for the Design/Development Phases (C/D) of the mission. The WBS shall be described to the subsystem level (i.e., Attitude Control System, Propulsion System, Structure and Mechanisms, etc.) for the spacecraft and to the instrument level for the payload. All other elements of the WBS should be to the major task level (Project Management, Systems Engineering, Ground Support Equipment, etc.).

b. Cost Estimating Technique. Describe the process and techniques used to develop the Phase C/D cost estimate. Provide a description of the cost-estimating model(s) and techniques used in the Phase C/D cost estimate. Discuss the heritage of the models applied to this estimate including any known differences between missions contained in the model's data base and key attributes of the proposed mission. Include the assumptions used as the basis for the Phase C/D cost and identify those which are critical to the cost sensitivity in the investigation. Identify any "discounts" assumed in the cost estimates for business practice initiatives or streamlined technical approaches and the basis for these discounts. Describe how these have been incorporated in the cost estimate and will be managed by the investigation team.

c. Workforce Staffing Plan. Provide a workforce staffing plan (including civil service) which is consistent with Work Breakdown Structure. This workforce staffing plan should include all team member organizations and should cover all management, manufacturing, technical (scientific and engineering), and support staff. The workforce staffing plan should be phased by fiscal year. Time commitments for the Principal Investigator, Project Manager, and other key personnel should be clearly shown.

d. Phase C/D Time-Phased Cost Summary. Provide a summary of the total Phase C/D costs consistent with Figure G2. The Phase C/D cost summary should be developed consistent with the Work Breakdown Structure and should include all costs to NASA, along with all contributed costs. The Phase C/D time phased cost summary should be phased by fiscal year.

3. Mission Operations (Phase E) Cost Estimate. This section provides a cost estimate for performing the Mission Operations for Phase E. Reference may be made to the Technical Approach and Management sections of the proposal. In completing this section, the guidelines for Phase C/D apply. Proposers may refer to the information provided in Appendix E and the DPL for mission operations and communications costs, if NASA systems are proposed.

4. Total Mission Cost (TMC) Estimate. This section should summarize the estimated costs to be incurred in Phases A through E including: Preliminary Analysis/Technical Definition Phases (Phase A/B); Design and Development Phase (Phase C/D); Mission Operations and Data Analysis Phase (Phase E); Launch vehicle, upper stages, and launch services; Deep Space Network and other ground system costs; and cost of activities associated for social or educational benefits (if not incorporated in any of Phases A through E). The total mission cost estimate should be developed consistent with the Work Breakdown Structure.

   This section should include:

   Detailed plans for all aspects of the mission not discussed elsewhere in the proposal, including: the launch vehicle, upper stages, and launch services; Deep Space Network and other ground system; activities associated with social or educational benefits. Reference may be made to the Technical Approach section of the proposal. In completing this section, the following guidelines will apply:

   a. Total Mission Cost. A summary of the Total Mission Cost time-phased by fiscal year must be included in the format shown in Figure G1. Dollar amounts should be shown in real-year dollars. Total Mission Costs should be summarized in real-year dollars in the last column of this table. This summary should represent the optimum funding profile for the mission. Assets provided as contributions by international or other partners should be included, and clearly identified, as separate line items.

FIGURE G1

TOTAL MISSION COST FUNDING PROFILE TEMPLATE
(FY costs* in Real Year Dollars, Totals in Real Year Dollars)

Item	FY1	FY2	FY3	FY4	FY5	FY6	...	FYn	Total (Real Yr.)
Phase A/B	$	$	$	$	$	$	$	$	$
- Organization A									
- Organization B									
- etc.									
Phase C/D	$	$	$	$	$	$	$	$	$
- Organization A									
Phase E	$	$	$	$	$	$	$	$	$
- Organization A									
ELV and services	$	$	$	$	$	$	$	$	$
- Organization A									
DSN and Other Tracking Support	$	$	$	$	$	$	$	$	$
- Organization A									
Other (specify)	$	$	$	$	$	$	$	$	$
Total Cost to NASA	$	$	$	$	$	$	$	$	$
Additional Contributions by Organization (Foreign or Domestic) to:									
Total Phase A/B	$	$	$	$	$	$	$	$	$
- Organization A									
Total Phase C/D	$	$	$	$	$	$	$	$	$
- Organization A									
Total Phase E	$	$	$	$	$	$	$	$	$
- Organization A									
ELV Costs	$	$	$	$	$	$	$	$	$
- Organization A									
Tracking Support	$	$	$	$	$	$	$	$	$
- Organization A									
Other	$	$	$	$	$	$	$	$	$
Contributed Costs (Total)	$	$	$	$	$	$	$	$	$
							Mission Totals		$

* Costs should include all costs including fee

FIGURE G2

TIME PHASED COST BREAKDOWN BY WBS AND MAJOR COST CATEGORY

(Phased costs in Real Year Dollars, Totals in Real Year Dollars)

WBS/Cost Category Description	Month 1 or FY1	Month 2 or FY2	• • •	Month n or FYn	Total (RY$)
Total Direct Labor Cost	$	$	$	$	$
WBS 1.0 Management					
WBS 2.0 Spacecraft					
WBS 2.1 Structures & Mechanisms					
WBS 2.2 Propulsion					
etc.					
Total Subcontract Costs	$	$	$	$	$
WBS # and Description					
:					
etc.					
Total Materials & Equipment Cost	$	$	$	$	$
WBS # and Description					
:					
etc.					
Total Reserves	$	$	$	$	$
WBS # and Description					
:					
etc.					
Total Other Costs	$	$	$	$	$
WBS # and Description					
:					
etc.					
Fee					
Other (Specify)					
Total Contract Cost	$	$	$	$	$
Total Other Costs to NASA	$	$	$	$	$
ELV and Launch Services					
DSN and Tracking Support					
Other (Specify)					
Total Contributions (Foreign or Domestic)	$	$	$	$	$
Organization A:					
WBS # and Description					
etc.					
Organization B:					
WBS # and Description					
etc.					
TOTAL COST FOR PHASE	$	$	$	$	$

K. APPENDICES

The following additional information is required to be supplied with the Concept Study Report. This information can be included as Appendices to the Report, and, as such, will not be counted within the specified page limit.

1. Resumes. Provide resumes for all key personnel identified in the Management section.

2. Letters of Endorsement. Letters of endorsement must be provided from all organizations participating in the investigation. Letters of endorsement should be signed by both the lead representative from each organization represented on the team, and by institutional and Government officials authorized to commit their organizations to participation in the proposed investigation.

3. Mission Definition and Requirements Agreement. A draft Mission Definition and Requirements Agreement should be provided. An example of a Mission Definition and Requirements Agreement is provided in the Discovery Program Library see Appendix E of this Announcement.

4. Statements of Work for each Contract Option. Provide draft Statement(s) of Work for all potential contracts with NASA. These Statement(s) of Work should (as a minimum) be for each contract option (i.e., Phase A/B, C/D, E) and clearly define all proposed deliverables (including science data) for each option, potential requirements for Government facilities and/or Government services, and a proposed schedule for the entire mission.

5. Incentive Plan. A draft Incentive Plan should be included with the proposal. This Incentive Plan should outline contractual incentive features for all major team members. Incentive Plans should include both performance and cost incentives, as appropriate.

6. Relevant Experience and Past Performance. Relevant experience and past performance (successes and failures) of the major team partners in meeting cost and schedule constraints in similar projects within the last ten years should be discussed. A description of each project, its relevance to the proposed investigation, cost and schedule performance, and points of contact (including addresses and phone numbers), should be provided.

7. International Agreement(s). Draft International Agreement(s) are required for all nondomestic partners in the investigation. An example of an International Agreement is included in Discovery Program Library.

The following information is not required, but may be provided.

1. References List. Proposals may provide, as an appendix, a list of reference documents and materials used in the proposal. The documents and materials themselves cannot be submitted, except as a part of the proposal.

2. Acronyms List.

APPENDIX H

CONCEPT STUDY EVALUATION CRITERIA

Although the concept for NASA evaluation of the Concept Study Reports has not been finalized, it will be conducted in much the same fashion as the evaluation of the proposals as discussed in Section 6.0 of this AO. However, in addition to considering changes to the science objectives from those in the phase one proposal, and the NASA portion of the total mission cost (TMC), this evaluation will consider in detail all factors related to the probability of mission success and to the realism of the proposed costs to NASA. In addition, this evaluation will consider other factors that enhance the return on NASA's investment in the investigation such as the infusion and transfer to the nonspace sector of new technology and the incorporation of goals for use of SDB, educational outreach, and public awareness activities during the implementation of the investigation.

Successful implementation of the Discovery Program demands, in addition to high scientific merit, that the investigation be achievable within the established constraints on cost and schedule. The information requested in Appendix G will enable the evaluation panel to determine how well each mission team understands the complexity of its proposed investigation, its technical risks, and any weaknesses that require specific action during Phase A/B.

Evaluation Criteria

In particular, the evaluation of the Concept Study Reports will consider five major criteria: scientific merit, total mission cost to NASA, technical merit and feasibility of science implementation, feasibility of mission implementation, and value for cost to NASA. These five criteria will be evaluated as follows:

A. Scientific Merit of Investigation.

The scientific merit of each investigation, as established by the peer review of the phase one proposal, will be reexamined to determine whether significant changes have resulted from evolutionary changes introduced during the Concept Study. The definitions and process for evaluating this criterion will be the same as those used for the phase one peer review.

B. Total Mission Cost (TMC) to NASA.

The NASA portion of the TMC will be derived from the detailed cost estimates presented in the Concept Study Reports and will constitute this criterion. An assessment of the credibility of these detailed costs estimates, including their underlying rationales, will be a factor in this derivation. The NASA portion of the TMC resulting from the Concept Study shall not increase by greater than 20% from the NASA portion of the TMC proposed in phase one and must not exceed the overall Discovery Program cost constraints (see Section 3.6 of this AO).

C. Technical Merit and Feasibility of Science Implementation.

The information requested in Appendix G for the Concept Study will be used to evaluate each investigation in detail for its technical merit, scientific feasibility, resiliency, and probability of success.

D. Feasibility of Mission Implementation.

This evaluation will consider the proposer's understanding of the processes, products, and activities required to accomplish development of all elements (e.g., flight systems, ground and data systems, etc.) and integration and the adequacy of the proposed approach. The technical approach will be examined in its entirety to ensure that: (1) all elements and processes are addressed, (2) weaknesses and design issues are understood and plans for resolution have been identified, (3) fundamental design trades have been identified and studies planned and (4) primary performance parameters have been identified and minimum thresholds established. The overall approach (including schedule), the specific design concepts, and the known hardware/software will be evaluated for soundness, achievability, and maturity. Resiliency and margins will be factors in this evaluation. The experience and expertise of the development organizations will be important factors in assessing the probability of success. Innovative cost effective features, processes, or approaches will be rewarded if proven sound.

The information provided in the Management section should demonstrate the proposers' plans, processes, and organization for managing and controlling the development and operation of the mission and will be evaluated on the soundness and completeness of the approach and the probability that the management team can assure mission success. The soundness and completeness of the approach will be evaluated by reviewing the organizational structure (including roles, responsibilities, accountability, and decision making process) and the processes, plans, and strategies the team will use to manage the various mission elements. Factors in this evaluation will include: clear lines of authority, clean interfaces, prudent scheduling and cost control mechanisms, review processes, and demonstrated awareness of all necessary management processes. Factors in the evaluation of the probability of mission success will include the experience, expertise, and commitment of key personnel and the organizations to which they are attached, the adequacy of facilities and equipment proposed for the mission, the adequacy of the team's approach to risk management, and the adequacy of the management and control mechanism. Innovative management processes and plans will be rewarded if proven to be sound.

The completeness of the Phase A/B plans will be considered in determining the adequacy of the Phase A/B approach. This will include an evaluation of the activities/products, the organizations responsible for those activities/products, and the schedule to accomplish the activities/products. The realism of the cost estimates and the planned financial resiliency will be evaluated. The underlying rationales for the cost estimates and the development schedule will be factors in this evaluation.

E. Quality of Education, Outreach, Technology, and Small Disadvantaged Business Plan.

The information provided in the education, outreach, technology, and small disadvantaged business plan will demonstrate the proposers' plans for educational program activities, public information programs, use of new technologies, and a commitment to minority participation. Educational program activities will be evaluated on their potential impact on different educational levels and public information programs will be evaluated on their potential to excite and involve the public. Use of new technology will be evaluated based on its innovation and benefit to the investigation, and potential to foster the conception and development of new commercial products which result in the creation of new market demand and new U.S. jobs. Proposers should address how developmental problems with new technology will be addressed in order to ensure mission success. A commitment to minority participation, as described in Appendix A, will be evaluated against the mandated 8% goal.

F. Value for Cost to NASA.

This criterion is evaluated by the following algorithm. A figure of merit for overall value of the investigation is defined as its scientific merit (criterion "A" above), weighted 80 percent, combined with the education, outreach, technology, and small disadvantaged business evaluation (defined below), weighted 20 percent. "Value for cost to NASA" is defined as the quotient of this figure of merit divided by the NASA portion of the TMC.

APPENDIX I

DISCOVERY PROGRAM PLANNING BUDGET PROFILE

The Discovery Program funding profile for future missions is subject to a wide variety of pressures. For planning purposes, the five (5) year forecast of NASA funding for this mission is provided in the table below (in Real Year Million Dollars). These levels represent the highest level acceptable for the year, but unused portions of earlier funds can be used in the next year if necessary. In addition, these levels represent the total available to Discovery missions for all costs to NASA, including launch vehicle costs as provided in Discovery Launch Services Information Summary document located in the Discovery Program Library (See Appendix E).

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003
Total	$53	$47	$100	$69	$30

The NASA forecast for specific budgets beyond the year 2003 are not yet available. The NASA budget for years beyond the year 2003 should be sufficient to cover any funding requirements necessary for missions proposed to this AO. Consequently, Discovery missions do not need to consider yearly funding limitations for FY 2002 and out.

APPENDIX J

NASA NEW START INFLATION INDEX

Cost data is requested in real-year dollars. The inflation rates to be used in the calculation of real-year dollars, and the resultant inflation totals, are shown by year in the following table:

Fiscal Year	1998	1999	2000	2001	2002	2003	2004	2005
Inflation Rate	0.0%	3.8%	4.1%	3.9%	3.9%	3.9%	3.9%	3.9%
Cumulative Inflation Index	1.000	1.038	1.081	1.123	1.166	1.212	1.259	1.308

Note: Use an inflation rate of 3.9% for years beyond 2005.